A new World Geography for Canadian Schools



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A NEW WORLD GEOGRAPHY

FOR CANADIAN SCHOOLS

Authorized for use in the schools of Alberta
Approved for use in the schools of Ontario
Authorized for use in the schools of Prince Edward Island

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A NEW WORLD GEOGRAPHY

FOR CANADIAN SCHOOLS

Illustrated with
PHOTOGRAPHS, MAPS AND DIAGRAMS

J. M. DENT & SONS (CANADA) LIMITED
TORONTO - VANCOUVER

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First printing in this edition, May, 1952
Second printing, April, 1953
Third printing, October, 1953

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PRINTED AND BOUND IN CANADA

T. H. Best Printing Co., Limited, Toronto

PREFACE

There have been innumerable changes in many fields since the original edition of *A World Geography for Canadian Schools* was published in 1935. These have been incorporated into the present text without enlarging its scope. Its use presupposes, as did that of its predecessor, the daily and continued use of an atlas and globe.

The relationship of man to his environment has, broadly speaking, been going through an evolutionary pattern which can be broken down into three main stages. The first stage was when man was more or less at the mercy of his physical environment. The second stage was when man commenced to control his own destiny within certain limits, although he was still not the dominating factor.

The third stage is the one upon which we are now entering. This is the period in which man shall develop the technology to dominate his physical environment. Whether this new knowledge will be used for the betterment of the human race remains to be seen.

With these considerations in mind, the textual matter has been selected largely upon an economic basis, with emphasis on the occupations and industries of people in different sectors of the globe. How nature exercises her controls over a given region, how the people react to their environment, and the extent of their success or failure are important considerations in present-day geography. The scientific study and explanation of the nature and purpose of things bring geography into the class of reasoning subjects. The sections on physical, regional, human and economic geography should be constantly referred to and these principles clearly understood. The pupil will then find the study of geography to be so much more than the memorization of facts and figures.

The editors of this edition have revised both the textual material and the organization of the world divisions, which are now dealt with on a purely regional basis. When considering certain regions in both Europe and Asia, it has been impossible to describe in more than a very general way the present-day life of the people. Some explanation is given, however, to clarify the political status of countries which have suffered changes since the second World War.

142183

The maps and pictures are all new in this edition. The pictures have been selected on a functional basis. Many more could have been used if space had permitted, but the inclusion of textual material has been given precedence throughout.

The statistical material has been cut to a minimum, and where amounts and values have been used to explain size and quantity of production, they are for comparative purposes only and are not to be memorized. The figures used are the latest available at the time of going to press. When further figures and statistical data are required, the student is advised to consult standard works of reference such as *The United Nations Statistical Yearbook*, *The Canada Year Book*, and the *Information Please Almanac*.

The use of supplementary reading material is necessary for the proper enjoyment of geography and for a thorough understanding of the conditions of living in any given area. No text of this kind can be definitive, much more could be written about any region or country and it is hoped that, on the part of the pupil, the study of this book will be an incentive to him to read further and deeper into the subject.

PREFACE TO REVISED EDITION, 1953

In this second printing of *A New World Geography for Canadian Schools*, the editors have made several additions and changes in the text which bring it once more up to date in view of new developments, particularly in Canada.

The pagination throughout the book remains almost unchanged, with the exception of the section on Southern Ontario which has been re-written in greater detail. Grateful acknowledgment is made to Dr. D. F. Putnam of the Geography Department, University of Toronto, for his assistance during this revision.

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A NEW WORLD GEOGRAPHY

FOR CANADIAN SCHOOLS

Mexico's new volcano, Paricutin, has become the best volcanological laboratory in the world. It erupted in 1943 in an Indian's ploughed field and in five months it built itself into a mountain more than 1,000 feet high and a mile wide at its base.

Photo, courtesy of Wheeler Newspaper Syndicate



PART ONE: General Geography

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THE EARTH AS A PLANET

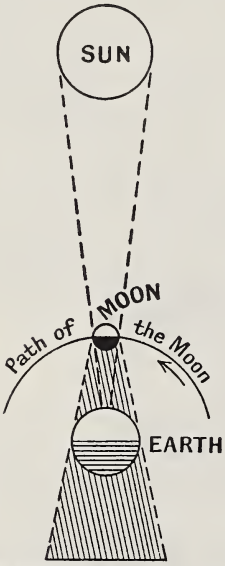
The sun is the centre of the solar system. Around it nine large planets revolve and from it they receive heat and light. Our earth is one of these planets. It is larger than Mercury, Mars, Pluto,[1] or Venus, but much smaller than Jupiter, Saturn, Uranus, or Neptune.

Each planet moves around the sun in an elliptical orbit or path. The time required for one complete revolution is called a year, but each planet follows its own orbit with its own length of time, so that each has its own year. Mercury's year of 88 days is the shortest, while Neptune's is about equal to 165 of our years.

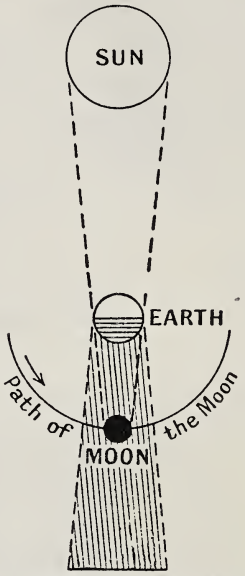
Some planets have smaller bodies called satellites, which revolve around them just as the planets revolve around the sun. The earth has one satellite, the moon; Uranus has four, Mars has two, Neptune has one, Venus and Mercury have none, while Saturn and Jupiter are bountifully supplied with ten and nine respectively. The moon has no light of its own. Moonlight is reflected sunlight, just as the glow from a 'danger sign' is reflected light from the lamps of an automobile.

[1]Pluto—discovered 1930, at Lowell Observatory. Estimated to be about the size of Mars. Its position is just within the orbit of Neptune; owing to its small size and distance from the earth it is doubtful whether a measurable disk can be seen.

An eclipse.—Sometimes the moon, while following its orbit, comes directly between the earth and the sun and hides the sun completely from part of the earth. This we call an eclipse of the sun. At other times the earth comes between the sun and the moon, giving us an eclipse of the moon. The best proof that the earth is a sphere lies in the fact that its shadow, as seen on the moon during an eclipse, is always round.



ECLIPSE OF THE SUN



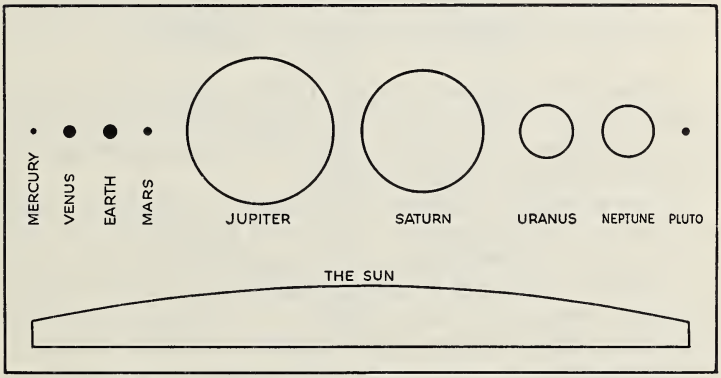
ECLIPSE OF THE MOON

Adapted from Physical Geography, *by Newbigin (Dent)*

The form of the earth.—The earth is spherical in shape. It may be compared to a billiard ball because it is round in the same way. However, you may say that a billiard ball is smooth and the earth is rough and irregular. Remember the great size of the earth as compared to the ball and the large proportion of water surface on the earth. If the ball were enlarged to the same size as the earth, it would be just as rough and irregular. Similarly, the slight difference of 27 miles between the Polar and the Equatorial diameters of the earth is insignificant compared to the actual diameter of 7,926.5 miles. Various proofs that the earth is round have been advanced. The best of these is the one mentioned in a previous paragraph. A cylinder or disk will sometimes cast a round shadow, but only a sphere will always do so. The

shape of the earth must be round, because ships have sailed around the world. When a vessel approaches land, we see first its masts and later its hull, which is another proof of the curved surface of our earth. When these experiences have been repeated thousands of times and from many locations, it becomes a certainty that the earth does not depart greatly from the form of a sphere.

The size of the earth.—The circumference of the earth is about 25,000 miles and the diameter nearly 8,000 miles. Modern methods of travel cause these distances to mean much less than in earlier days. Jules Verne's hero performed a remarkable feat when he encircled the globe in eighty days; Wiley Post established

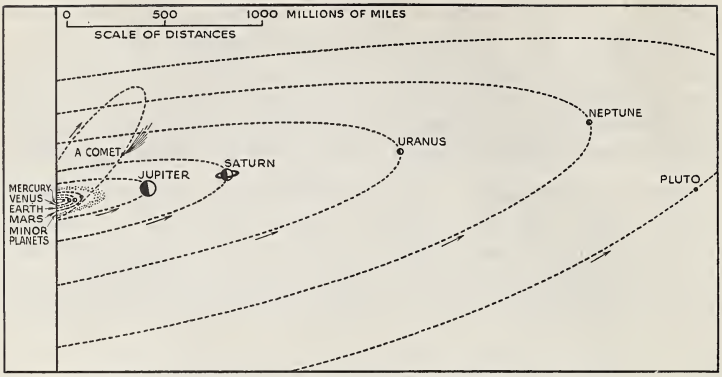


RELATIVE DIMENSIONS OF THE SUN AND PLANETS

a record when, in 1933, he flew 'around the world' in 7 days, 18 hours, 49½ minutes; and a new record was set in August, 1951, when a new British jet bomber, the 'Canberra', flew from northern Ireland to Gander, Newfoundland, a distance of 2,100 miles, in 4 hours, 18 minutes.

MEANS OF MEASUREMENT

It was when man desired to travel for the sake of trade that it became necessary to know with some degree of accuracy the location of places he desired to reach. A method of dividing maps of the world into small oblongs, by means of lines running from north to south and from east to west, was devised. The same system, extended and improved is used today. Longitude is distance east and west, while latitude is distance north or south of the equator.



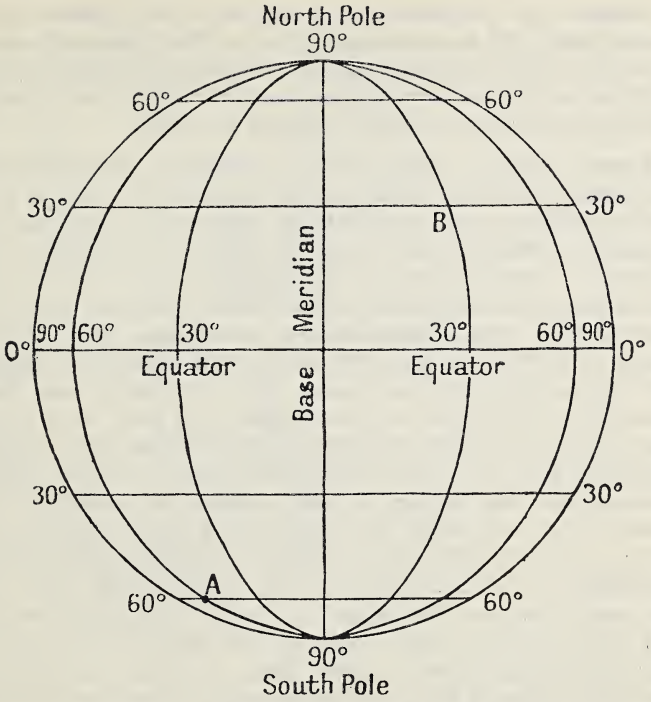
RELATIVE DISTANCES OF THE PLANETS FROM THE SUN

Latitude.—The distance of about 12,500 miles from the North Pole to the South Pole is divided by the Equator into north latitude and south latitude. Even this 6,250 miles is so great that further sub-division has been found necessary.

We all know that a circle has 360 degrees. A line drawn round the earth through the poles is a circle. If drawn from one pole to the other it is a half-circle or 180 degrees, and if drawn from the Equator to either pole it is a quarter-circle, or 90 degrees. Latitude is measured by these degrees. The starting point at the Equator is termed 0 degrees, while the farthest points, 90 degrees, are at the poles.

For ordinary purposes, the width of 1 degree of latitude is said to be 69 miles, obtained by dividing the earth's circumference of 25,000 miles by 360. To show this on a map, lines known as *parallels of latitude* are drawn running around the earth parallel to the Equator. There is one of these for each degree if the map is large enough, but usually only those at intervals of five or ten degrees are shown.

Longitude.—In order to measure longitude, or distance east and west, authorities have agreed to accept the observatory of Greenwich, near London, England, as a starting point. Our maps show a line running through Greenwich from the North Pole to the South Pole. This line is called the Zero or Base or Initial Meridian, and from it east longitude and west longitude are measured. If we travel east from the base meridian half-way round the world, we go a complete half-circle, or 180 degrees. If we travel west we shall also pass over 180 degrees, so that the highest longitude we can have is 180 degrees or 180 degrees west longitude.



This shows how meridians of longitude and parallels of latitude are arranged on a map. The letter A is at 60° south latitude and 60° west longitude. Where is B located?

Longitude is shown on maps by *meridians of longitude*. These run from the North Pole to the South Pole, and are named according to their distance from the base meridian. The 180-degree meridian runs through the eastern tip of Siberia, the Pacific Ocean, and to the east of New Zealand.

Meridians of longitude are not parallel, but come to a point at the poles. This is shown in the following table:

LENGTH OF DEGREES OF LONGTITUDE AT CERTAIN LATITUDES

At Latitude	*Miles*	*At Latitude*	*Miles*
0	69.172	50	44.552
10	68.129	60	34.674
20	65.026	70	23.729
30	59.956	80	12.051
40	53.063	90	0.000

Latitude and longitude have many uses. They enable us to locate places and to determine distances. They frequently serve as boundary lines between countries, provinces, and smaller areas. Ships at sea find and report their position by them, and there is a definite relationship between longitude and time.

Time.—When we travel west from Toronto to Vancouver over the Canadian Pacific Railway, we put our watches back one hour at Fort William, again at Broadview, and again at Field; and at Armstrong, Watrous and Jasper, if we are travelling over the Canadian National Railways. These changes may take place not on the actual time-belt boundaries as shown in the map, but at the nearest station where transcontinental trains stop. This is determined by the fact that the earth rotates from west to east through 360 degrees in twenty-four hours, or 15 degrees in one hour. Therefore the sun rises one hour earlier at a place in 0 degree than it does at a place in longitude 15 degrees west. If Greenwich time were kept all over the world there would be little relation between time and daylight in many places. In Vancouver, for instance, the clock would show noon several hours before sunrise.

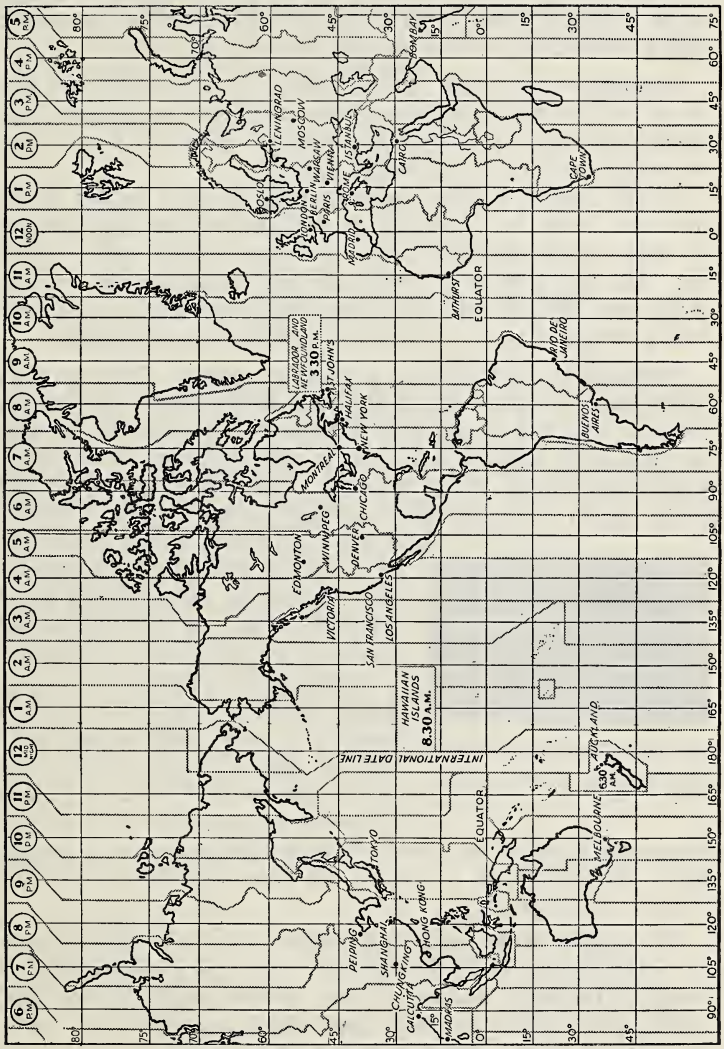
To avoid such difficulties, a system of standard time has been established for all communities in the civilized world. If we set our time by the sun, that is, set our clocks at 12 noon when the sun has reached its highest point in the heavens, we would be following what is known as Solar Time. Standard Time approximates Solar Time in that belts fifteen degrees of longitude in width have the same time. These are started 7½° east and west of Greenwich. Standard Time Belts, however, are made to suit the convenience of the people who live within the area, as shown by the accompanying map.

The International Date Line.—If a man went westward around the world and, at the end of every fifteen degrees, put his watch back one hour, he would find on his return that he was twenty-four hours, or one whole day, behind the home calendars. The twenty-four hours that he had 'lost' by moving his watch back would have amounted to a day; he would say it was Sunday when it was really Monday.

In travelling to the east an opposite condition arises. The watch is put ahead one hour for each fifteen degrees, with the result that, on returning from a 'round-the-world' tour, twenty-four hours will have been gained and Monday will be called Tuesday.

The International Date Line has been established to correct this difficulty. It is located in the middle of the Pacific Ocean near the

180th meridian where it can cause very little inconvenience, because it passes through no populated areas. Every time that



THE STANDARD TIME BELTS OF THE WORLD

When it is 9 a.m. in Vancouver what time is it in Halifax?

travellers cross this line from east to west the calendar is put ahead one day; and from west to east it is moved back one day.

MOVEMENTS OF THE EARTH

The chief motions of the earth are its *axial rotation*; or turning on its axis from west to east, and its *orbital motion*, sometimes called 'revolution', around the sun once a year.

Rotation.—The length of this turning, which we term one day, is our unit for measuring time. For convenience we divide it into twenty-four hours of sixty minutes each. If the earth turned faster we would have more and shorter days.

As the earth is a globe, only half of it can face the sun at any one time, hence half has light or day, and the rest has darkness or night. Rotation means that these halves are constantly changing. The sun appears to rise in the east, cross the sky, and set in the west. But, in reality, the sun is stationary, and it is the earth which rotates. This is the real cause of day following night.

Direction is determined as a result of rotation. The sun rises in the exact east and sets in the exact west on only two days in the year, 21st March and 23rd September. However, we are able to get a fairly correct idea of these two directions by observing sunrise and sunset. From these we readily determine north and south. North is the direction most easily found at night. The axis of the earth points almost directly to the North or Pole Star. This star is easily located, as the adjoining figure will show. When we walk toward the North Star we are travelling due north.



How to find the North Star

The two stars at the end of the Dipper point to the Pole Star.

The mariner's compass is a magnetized needle mounted on a point to permit it to move freely in any direction. It always points towards the north magnetic pole, which is located in Boothia Peninsula, about 20 degrees from the true pole. Because of this, the compass is not a reliable guide. It is, however, a valuable aid when both the sun and the stars are invisible.

The motion of the earth in its orbit.—A year is one complete revolution of the earth around the sun. The time required is nearly 365¼ days, but we say that our year contains 365 days, except every fourth or 'leap' year, which has 366 days. Even this adjustment does not give a perfect result, and it is necessary to omit the extra leap-year day three times in four hundred years.

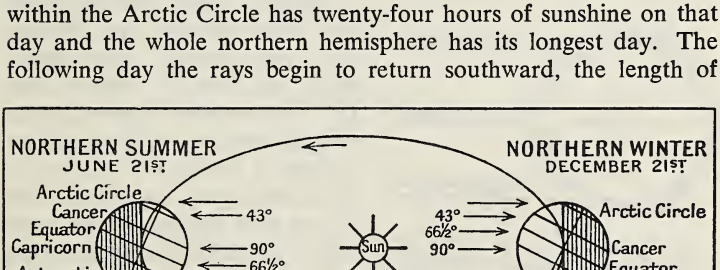
We know that we have much less daylight in winter than in summer. Why is this? The answer is easy to state, but not so

easy to understand. It is because the axis of the earth is inclined 23½ degrees from a line drawn perpendicular to the plane of the earth's orbit. If the axis were perpendicular, the days and nights would be equal everywhere. Since the axis is inclined they differ greatly, as the following table will show:

Latitude	*Longest Daylight*
0	12 hours 8 minutes
10	12 " 43 "
20	13 " 21 "
30	14 " 43 "
40	15 " 1 "
50	16 " 23 "
60	18 " 53 "
70	73 days of continuous sunlight
80	138 " " "
90	192 " " "

As the earth revolves round the sun its axis has always the same 23½ degrees inclination. An examination of Fig. 6 shows that this angle causes the North Pole to lean toward the sun during the northern summer and away from it in the northern winter. It also shows that on 21st June all the area within the Arctic Circle receives the sun's rays as does also more than half of the earth's surface north of the Equator. On 21st December the Arctic Circle receives no rays from the sun; and they reach less than half of the earth's surface north of the Equator. In the southern hemisphere conditions are the reverse of those in the northern.

On 21st June, the sun's rays have reached so far north that they extend 23½ degrees beyond the North Pole. The entire area within the Arctic Circle has twenty-four hours of sunshine on that day and the whole northern hemisphere has its longest day. The following day the rays begin to return southward, the length of



We have summer as a result of (1) more hours of sunlight and (2) more heat by direct sun-rays. When there is less of each, winter comes.

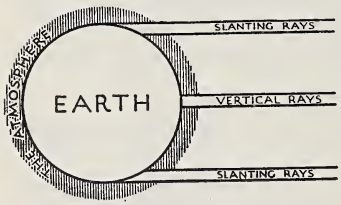
our day lessens, 'the circle of illumination' approaches closer to the North Pole until, on 23rd September, the date of the *autumnal equinox* (from the Latin words meaning 'autumn', and 'equal nights'), equal day and night exist throughout the world and sunlight reaches both North and South Poles. Therefore, between 21st June and 23rd September is our season of greatest heat when many of our crops mature and we have 'summer' weather.

From 23rd September to 22nd December the rays of the sun continue to shine farther and farther south until, on the latter date, they have reached 23½ degrees beyond the South Pole and the whole area within the Arctic Circle is dark. Our nights are steadily becoming longer than our days; in the southern hemisphere the days are lengthening and the nights growing shorter.

On 21st March sunshine again extends from pole to pole. One-half of every parallel of latitude receives it; days and nights are of equal length everywhere; winter is over and spring is beginning; it is the *vernal equinox* (from the Latin words meaning 'spring' and 'equal nights'). Until 21st June the sun's rays advance beyond the North Pole and our days grow gradually longer.

THE SEASONS

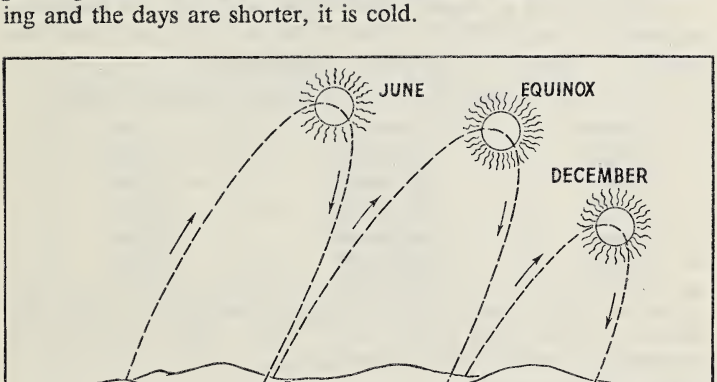
The variation in the length of day and night is one cause of the change of season. The other cause is the angle at which the sun's rays strike the earth. These rays shine vertically throughout the year on some part of the region within 23½ degrees of the Equator. North and south of this area they strike the earth at an angle which steadily increases as we approach the poles.



This illustration shows that vertical rays bring more heat to the earth than oblique rays. The vertical rays pass through less atmosphere than do the oblique rays and, when they strike the earth, they spread their heat over much less space.

Vertical rays produce more heat than slanting rays because they pass through less atmosphere, and therefore lose less heat (for atmosphere absorbs heat); also because they strike a smaller surface of the earth (see Fig. 7). A simple proof is easily found in any hilly region. In the early spring compare a southern slope with a northern one. Invariably it will be found that the snow has disappeared sooner and that the vegetation is further advanced on the former than on the latter. The reason is that the sun's rays are more nearly vertical on the south side of the hill than on the north.

In Canada, and other temperate regions, we have warm weather during the summer because our days are long and the sun's rays are more nearly vertical than in winter. Farmers in the Peace River district, despite late springs and early frosts in autumn, raise the best wheat in the world because they have long days in the growing season. During the winter, when the rays are more slanting and the days are shorter, it is cold.



THE COURSE OF THE SUN

The Equator has days and nights of nearly equal length throughout the year and the sun's rays are always vertical or nearly so. It follows that everywhere in the tropics there is very little change of seasons, so far as temperature is concerned. Equatorial seasons are not 'summer' and 'winter', but 'wet' and 'dry'.

The polar regions experience extreme cold in winter because the rays of the sun are very slanting and the days are either short or do not exist at all. In summer the days are very long, but as the sun's rays are still slanting there is hot weather for only a short time. We can understand how important long days are when we remember that flowers and small plants grow amazingly on the shores of the Arctic Ocean and that Mr. Stefansson, the northern explorer, describes the flies and mosquitoes of summer as a greater nuisance than the cold and darkness of winter.

EXERCISES

1. How to tell the new moon—when the semicircle looks to the right. When the moon is waning, the semicircle looks to the left.

2. Can you explain why the sun is higher in the sky, at Toronto in summer than it is in winter?

3. Why is it warmer in summer, at Edmonton, than in winter? There are three good reasons, can you find them?

4. Remembering that the earth rotates, can you estimate the rate of speed per hour at which Cotopaxi Volcano is moving?

5. Does Mount Jacques Cartier move as rapidly as Cotopaxi?

6. With the sun as centre, draw circles to indicate the position of the planets in their orbits, in relation to the sun. On each circle draw a planet to scale. Here are the data which you require:

	Distance from sun in miles	*Diameter in miles*
Mercury	36,000,000	3,000
Venus	67,200,000	7,600
Earth	92,900,000	7,926.5
Mars	141,500,000	4,200
Jupiter	483,300,000	88,700
Saturn	886,100,000	75,100
Uranus	1,782,800,000	30,900
Pluto[1]	2,200,000,000	4,500
Neptune	2,793,500,000	33,000

Diameter of the sun, 853,380 miles; of the moon, 2,160 miles. Distance of moon from earth, 240,000 miles. Exact equatorial circumference of earth, 24,901.8 miles.

[1]Figures given are estimates.

2

CLIMATE

The importance of atmosphere.—The air we breathe is so familiar to us that we scarcely give it a thought, much less realize how essential it is to our life and comfort. Without it we could not live nor could any plants and animals upon the earth; even the fish of the sea and the birds of the air would die. During the day the heat would be unbearable and the cold at night would be more severe than that of an Arctic winter. We should have neither clouds, nor rain nor snow. The rainbow would never be seen, nor would the beautiful colours of sunset; the song of the birds would not be heard, for sound would be impossible.

The nature of the atmosphere.—The atmosphere is an envelope which surrounds the earth and is held to it by gravity. It extends at least two hundred miles above the earth and probably a good deal farther.

Near the earth's surface, dry air consists of about 78% of nitrogen, 21% of oxygen, nearly 1% of argon and smaller amounts of carbon dioxide, hydrogen, and neon, helium, and other rare gases. Water-vapour is present at the surface to the extent of about 1.2% of the total, and dust exists in perceptible amounts.

Oxygen enables plants and animals to maintain life; it makes fire possible, and it assists in the decay of plants and animals. The main value of *nitrogen* is to dilute oxygen, which, if pure, would quickly cause our bodies to 'burn up', in addition it is an important element in certain fertilizers which stimulate plant growth. *Carbon dioxide*, which forms a very small part of the air, is an important plant food. This gas plays a large part in protecting the earth from the full heat of the sun's rays during the day and in preserving part of this heat in the night. *Water-vapour* is responsible for clouds, rain, snow, and dew, while to dust we owe most of the beautiful colours of the sky and clouds.

Pressure.—Air has weight or pressure. The particles of which it is composed are pressed together by the weight of those above,

hence the air nearest the earth is under the most pressure and is densest. Heavy air means high pressure and light air means low pressure. Air from a region of high pressure tends to move toward air in a low-pressure area. If we pump air into an automobile tire we can raise its pressure to fifty pounds or more, which is high pressure—about thirty-five pounds higher than the pressure of the air outside the tube. If we then open the valve the air rushes out from the place of high pressure to the place of low pressure. A similar action is constantly happening on the surface of the earth, but on a much larger scale. Air is moving from areas of high pressure toward areas of low pressure, and this causes winds. If the difference in pressure is considerable, these winds are strong, but if it is slight, they are gentle.

The barometer.—Air pressure is measured by an instrument known as a barometer, which records it in inches. The principle of the barometer is that a column of air will exactly balance a column of equal weight of any liquid. A glass tube, sealed at one end, is partially filled with mercury and its open end placed in a cistern of mercury. As the air pressure changes, the mercury is caused to rise in the tube or to descend into the cistern. The tube is graduated in inches so that it may be read easily.

The pressure of air at sea-level, or, in other words, its weight, which is nearly fifteen (14.7) pounds on every square inch of surface, is shown by the barometer to be thirty inches. If the pressure is more than thirty inches it is said to be 'high'; if it is less than thirty inches, it is 'low'. The normal pressure at an altitude of 3,800 feet is 26 inches, at 8,200 feet it is 22 inches, and at 16,000 feet it is 17 inches. Pressure is also measured in millimeters, 760 millimeters being equal to approximately 30 inches of mercury. Meteorologists are now using a new standard, the millibar, 34 millibars corresponding to 1 inch of mercury.

On a weather map, lines are drawn joining places of equal pressure. These lines are called isobars. With the help of weather maps showing isobars, and other information, meteorologists forecast weather.

Other properties of air.—Air may be warm or cold. Warm air is lighter than cool air. In a room, warm air rises to the ceiling and cool air sinks to the floor. Similarly, in warm regions air tends to rise and to have low pressure.

Air may be moist or dry. All air, even in a desert, contains some moisture. We may not be able to feel, or see, or smell it, but its presence may be proved. If a pitcher of ice-water is left

standing in a warm room drops of water will soon appear on the outside of it; steam often appears on cold window-panes in winter. In both cases the moisture comes from the air.

Warm air can absorb more moisture than cold air; hence to dry our damp clothes in winter we leave them near the stove and not in the back porch. When air is cooled its ability to hold moisture decreases until it reaches the 'saturation point' when it can hold no more. Further cooling will cause precipitation to fall in the form of rain or snow. In deciding whether a place will have precipitation or not, ask yourself which way the air is moving and whether it is becoming warmer or cooler.

The most important facts to remember concerning air, in so far as geography is concerned, are:

(1) Warm air can hold more moisture than cold air.

(2) When air becomes warmer, it expands, becoming less dense. Heavier air moves into the area forcing the warm, lighter, air upwards.

(3) As air rises, it cools. If it cools below the saturation temperature, condensation of water-vapour occurs, causing clouds. If there is sufficient condensation, rain or snow falls.

CLIMATE

Weather may be defined as the day-by-day nature of the atmosphere in any locality; climate as the average of weather over a long period of time. Weather may, and does, vary greatly from one day or month to another. Climate, through the years, shows little change. It continues to be dry or wet, hot or cold, or temperate, despite minor changes from its established order.

Climatic elements.—Climate is the aggregate of several atmospheric conditions. Those of most importance are temperature, moisture, and air movement or winds.

Temperature varies greatly. The lowest recorded thermometer reading is—90° F. at Verkhoyansk in Siberia. The highest is 136.4° F. at Azizia, near Tripoli. In Canada, the lowest recorded reading is—81° F. at Snag in the Yukon and the highest is 115° F. at Gleichen, Alberta. Single readings are not reliable, however, and the temperature of a region is based upon the average of the readings for a number of years. For ordinary purposes statements regarding temperature are confined to the figures for January and June. These may be represented on maps by isotherms, which are lines connecting those places which have the same average temperature.

For our purpose, moisture may be considered as the precipitation of rain and snow. In countless localities throughout the world, daily records are kept of the amount of rainfall in inches, ten inches of snow being taken as equal to one inch of rain. The total annual amounts are important in estimating climate. The distribution throughout the year is equally important. Fifteen inches annually is sufficient for agriculture in temperate regions if much of it occurs during the growing season. If most of it comes during the autumn or winter, it may cause a desert. The driest district in the world is, probably, Iquique in Chile, with an annual rainfall of .05 inch. The wettest is Cherrapunji in India, with a mean of 428 inches and a maximum of 905 inches in one record year.

Winds are caused by the unequal heating of the atmosphere. They are an important element in climate, and have a marked influence on temperature and rainfall.

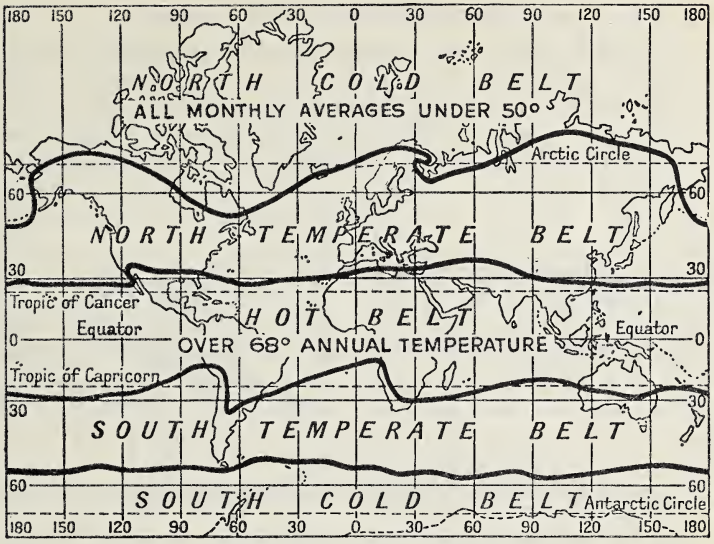
Climatic influences.—The factors that chiefly determine climate are:

(i) Latitude
(ii) Altitude
(iii) Nearness to large bodies of water
(iv) Prevailing winds
(v) The presence and direction of mountain chains
(vi) Ocean currents
(vii) The presence of forested areas

(i) Latitude

Latitude determines the angle at which the sun's rays strike the earth, and the number of hours of sunlight received during the day. Those regions which have the longest days do not receive the direct rays of the sun. When the average for the whole year is taken we find that the highest annual temperatures result from a combination of the two, and are found near each Tropic.

For purposes of climate the earth is sometimes divided into five heat belts, arbitrarily separated by selected isotherms. The centre of this division is the highest isotherm of the year, known as the "heat equator." This is an irregular line, shifting with the seasons, but generally a little north of the geographical Equator. On each side of it is the hot belt, the other boundaries of which are usually considered to be the 68° isotherms. The temperate belts have, as their polar limits, the isotherms of 50° for their warmest month. The cold belts are those within the polar limits.



THE HEAT BELTS OF THE EARTH

Hot Belt: above 68° F., mean annual temperature. Cold Belt: where every month averages below 50° F.

(ii) Altitude

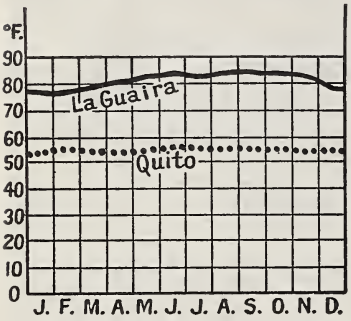
Lands with high altitudes are colder than lands at sea-level, the average rate or decrease of temperature being about 1° F. for every 300 feet of rise in height. This is because the higher air is thinner. When air rises, it expands and occupies more space because there is less weight above to compress it. When air expands it cools, and when it comes under pressure it contracts and becomes warmer.

There are many regions in the Tropics which have a temperate climate because of their altitude. In Mexico the coasts have tropical conditions, while the mountain plateau is moderate.

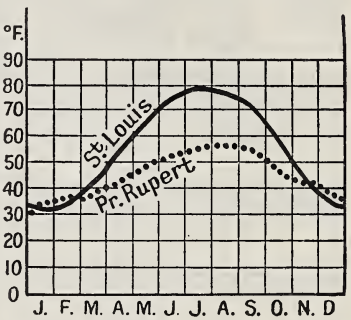
Precipitation is greatly influenced by altitude. Warm air can hold a great deal of moisture. When its temperature is lowered the moisture condenses and becomes visible in clouds and mist, or falls as rain or snow. Altitude increases the amount of precipitation and the proportion of it which falls as snow. This explains why more rain and snow falls on mountain tops than on the valleys below.

(iii) Nearness to large bodies of water

The temperature of water changes more slowly than that of land. It follows that the sea, in winter, is warmer than its neighbouring shores, and that it is cooler than the adjacent shores in summer. The air over a warm sea is warmed by contact with the warm water. If this warm air should blow in over a colder coast it tends



This diagram shows the influence of altitude on temperature. Quito (approximately 0 degrees lat.) has an altitude of 9,350 feet; La Guaira (approximately 10 degrees N. lat.) is at sea-level.



Prince Rupert is on the sea-coast, 54 degrees N. lat., and is at sea-level. St. Louis is in the centre of the continent, 38 degrees N. lat. (more than 1,000 miles farther south than Prince Rupert), and with an altitude of 568 feet. Why is St. Louis colder in December than Prince Rupert?

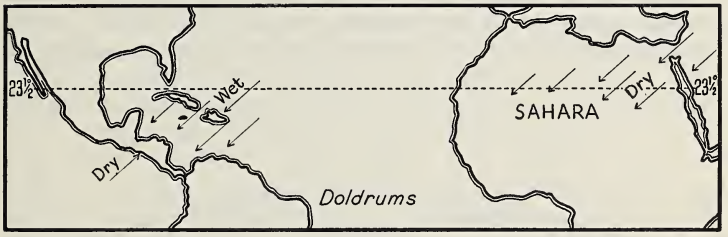
to raise the temperature of the land. The coasts of British Columbia and of the British Isles are well-known examples. They have a much more moderate climate than that of Labrador or Siberia, because the prevailing winds blow from the sea to the land. The Japan current and the Gulf Stream increase the temperature of the North Pacific and the North Atlantic respectively, but even without these the ocean waters would have a marked effect. Regions thus favoured are said to have a *marine climate,*

Interior regions, on the other hand, have a *continental climate* with extremes of heat and cold. The highest and lowest temperatures recorded in North America are at points remote from any sea. The lowest thermometer reading ever recorded on the Canadian shores of the Arctic is —54° F., yet temperatures of —60° and even —70° have been known in Alberta and the north-central United States. Of the three climatic influences which we have discussed, the Arctic coast of Canada is adversely affected by latitude only; its altitude is practically that of sea-level and it adjoins a large body of water. As a further illustration it may be

noted that the average January temperature of Prince Rupert is 3° higher than that of St. Louis, more than 1,000 miles farther south.

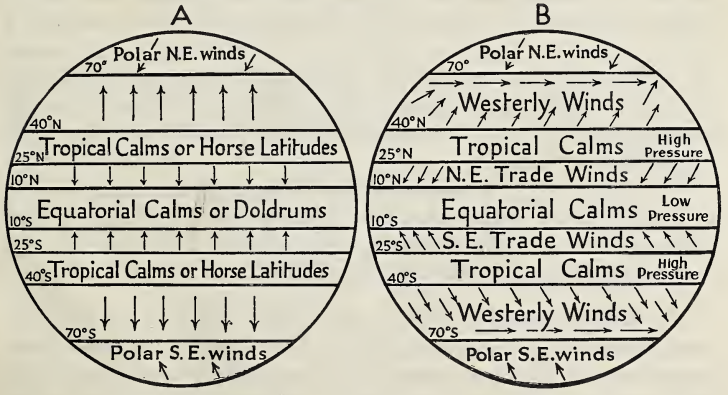
(iv) Prevailing Winds

Climate is very largely determined by the prevailing winds or the belt of calms in which the region lies. Winds are horizontal movements of the atmosphere and calms are air which is still or



moving vertically. If the air is rising, a region of low pressure calms results at ground level; if the air is descending, a region of high pressure calms results.

Planetary winds and calms.—In general, there are six belts of winds and five belts of calms encircling the earth. These are caused chiefly by unequal heating of the earth's surface, and, to some extent, by the rotation of the earth.

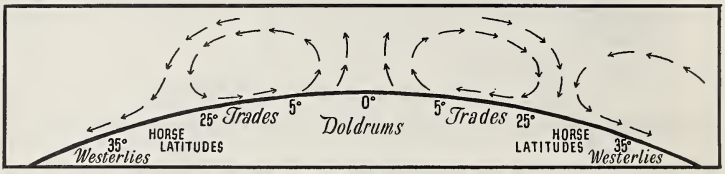


Without Rotation With Rotation

THE WIND BELTS OF THE EARTH

The Doldrums.—A region of low pressure calms is formed in the region of the heat equator. Because it is so hot, the air over the heat equator is less dense than the air to the north and south, and therefore it is forced upwards by air moving in from the north and the south. As it rises, it expands and cools, condensation of water-vapour takes place, and heavy rains result. The cooled air moves away to the north and south as upper air currents.

The Trade winds.—These winds blow steadily from the high pressure calms known as the Horse Latitudes towards the low pressure calms at the heat equator. As the winds move towards the heat equator, the air continually grows warmer, increasing its



capacity to hold moisture and, unless the Trades blow over land sloping upwards, they pick up moisture and are usually drying winds. The Sahara Desert is a Trade wind desert. The east coast of Central America is very wet owing to the effect of the Trade winds which here blow in from the sea, ladened with moisture.

The rotation of the earth causes the deflection of the winds. As the Trades originate in a region where the speed of the earth's rotation is about 21,000 miles in 24 hours, and blow towards a region where the speed of rotation is 25,000 miles in 24 hours, the winds tend to be left behind and come from the north-east and south-east rather than from north and south. Winds blowing towards the Poles are likewise deflected and blow from the south-west and north-west.

The Trade winds influence regions lying between latitudes 25° to 10°. Do not forget that the heat equator moves north and south with the sun and causes the whole system of winds and calms to move north and south with the seasons.

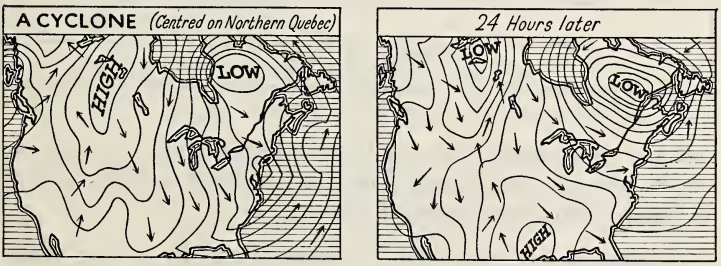
The Horse Latitudes.—These two belts of calms lie on the poleward sides of the Trade wind belts. The upper air currents flowing from the Doldrums descend in these regions which are about 30° from the Equator. As the air descends it is subjected to greater pressure, becomes warmer, and, therefore, its capacity to

hold moisture increases. The Horse Latitudes are always a region where it is very dry. Most of the great deserts of the world are influenced at some time of the year by these belts of high pressure calms.

The Westerlies.—The prevailing winds of regions in middle latitudes are the Westerlies, their true direction being from the south-west in the Northern Hemisphere and from the north-west in the Southern Hemisphere. Since the Westerlies are usually blowing from lower to higher latitudes, and are gradually being cooled, they will yield some moisture even at sea level. When such winds cross mountains they cause heavy rainfall on the windward slopes and become relatively dry on the leeward side. These conditions exist in North America, while in Europe, where there is no formidable mountain barrier, the moisture is carried far into the interior of the continent. The Westerlies blow very regularly in the Southern Hemisphere where there are no land masses to impede their progress. Here they are known as the 'Roaring Forties', and account for the violent winds off Cape Horn. In the Northern Hemisphere the influence of topography is felt more and so they are not as regular.

These Westerlies are characterized by great eddies hundreds of miles across blowing around centres of high or low pressure, and are known as cyclones or anticyclones. They are carried along in a general easterly direction by the prevailing Westerlies, and at the same time, whirling within themselves much as an eddy in a river turns while being carried down stream by the current.

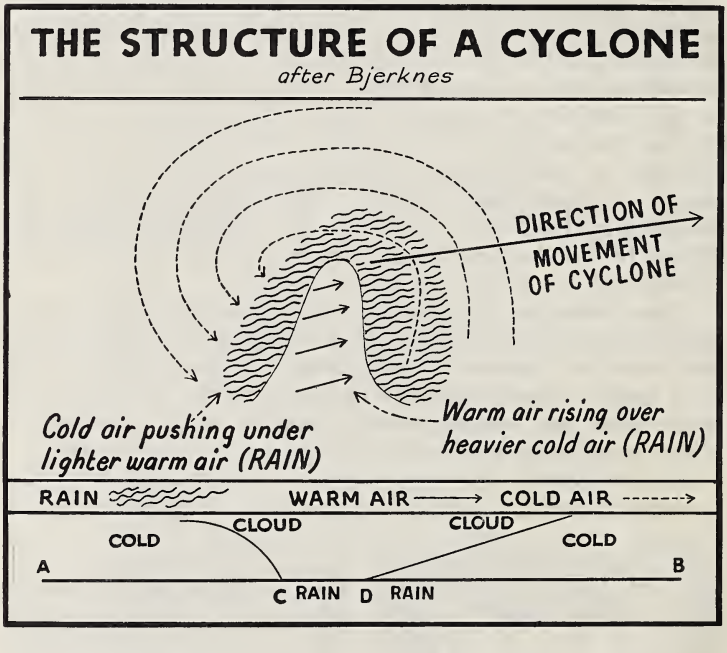
Do not confuse the term cyclone with the violent tropical cyclones known as hurricanes, typhoons or waterspouts, or with



the tornadoes of the Central United States. The diameter of these violent storms is comparatively narrow with a sharp drop in pressure towards the centre, as much as twenty-five per cent. These temperate belt cyclones are not violent but they do bring about

changes in weather conditions and account for the variability of climate in the areas over which they travel.

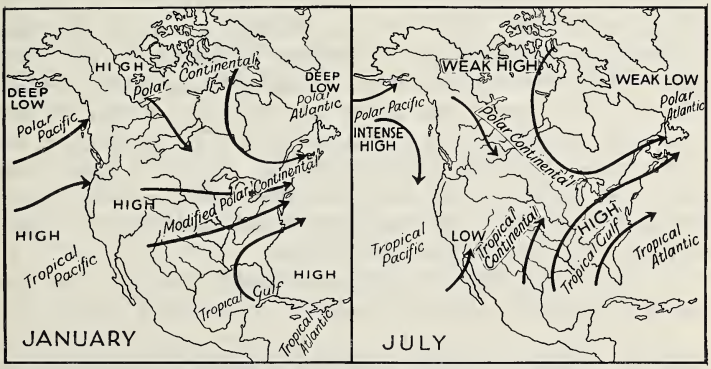
Causes of Cyclones.—Cold air masses from the Polar Regions are constantly moving against warmer air from the Tropics. The warm air rises over the heavier colder air or the cold air moves under the warmer air. It depends on which is moving the faster. The rotation of the earth, convection currents in the atmosphere,



and the topography of the land over which the air is moving all affect these air currents and cause their whirling nature. A study of the following diagram will illustrate.

Weather forecasting.—Where colder polar air pushes under warmer air, a cold front is formed. Where warm tropical air passes over colder air a warm front forms. The mixing of the warm air and cold air along a front is known as an occlusion. When these fronts form and occlusions develop, clouds usually

form and precipitation takes place as long as there is enough moisture in the atmosphere for that to occur. By studying the isobars on a map and taking into consideration other factors of weather, meteorologists can tell with a high degree of accuracy where these fronts may develop and thus forecast weather conditions 24 to 36 hours in advance.



Air Masses Affecting Climate of Canada

The paths of these high and low pressure areas across the North American continent are fairly consistent, and this fact aids the forecaster considerably. Weather predictions are inaccurate at times for the following reasons:—

1. Sometimes cyclones and anticyclones depart from the courses they commonly take.
2. Sometimes the rate of advance changes.
3. At times storms appear or disappear without warning.
4. Forecasts are sometimes based on imperfect data. This is particularly true for the Pacific Coast where ship broadcasts are relied on to give weather conditions over the Pacific.
5. Local surface features may change conditions in many areas considerably.

Much remains to be learned of upper air currents and the effects of Polar air currents. With the increase of air transportation,

accuracy of weather forecasts for safe flying is becoming of greater importance and much research is being done in that direction. The cost of meteorological service in Canada and the United States has been repaid many times by the saving of life, property, and crops by timely storm warnings issued by these services.

Land, sea and lake breezes are caused by the unequal temperatures of land and water. On a hot, summer morning at the seashore one can always feel a cool breeze coming from the sea. It continues all day. Why? As the morning sun shines the land becomes much hotter than the water, partly because it takes more heat to heat water than it does to heat soil, and partly because the sun's rays cannot sink as far into the earth as they do into water. In an hour or two the earth is hot. The air above it has also become heated and begins to expand. Soon it is lighter than the cooler air above the sea. Then the colder, heavier sea-air pushes the warmer, lighter land-air upwards and flows in to take its place. This is a sea—or lake—breeze.

In the evening the land cools more quickly than the water and the movements of the air are reversed, giving a land breeze.

Such winds are common in the hot belt during the summer months. They are of value in reducing the land temperature during the hot season, and in bringing pure air to the land.

Monsoons may be described as land and sea breezes on a large scale. Some lands become so hot during the summer that the wind from the sea continues throughout the hot season, while the wind from the land blows out to sea during the winter.

Part of eastern Asia and also northern Australia and the northern coast of the Gulf of Guinea have typical monsoon climates. The Monsoon winds account for the heavy summer rainfall along the south and east coasts of Asia and for the prolonged dry season. They are so pronounced in Asia because of the size of the land mass which causes a great range of summer and winter temperatures in the interior.

Mountain and valley breezes.—Mountain slopes facing the sun receive the rays of the sun directly. The air next to the slope is heated by contact and rises to higher levels. At night the slopes along the mountain cool rapidly. The air descends producing a 'mountain breeze'. This cool air will often descend several hundred feet into a valley, and may reach high velocity. These downdrafts are particularly hazardous in mountainous areas for aviation. 'Chinook winds', called 'Foehn winds' in Europe, are winds blow-

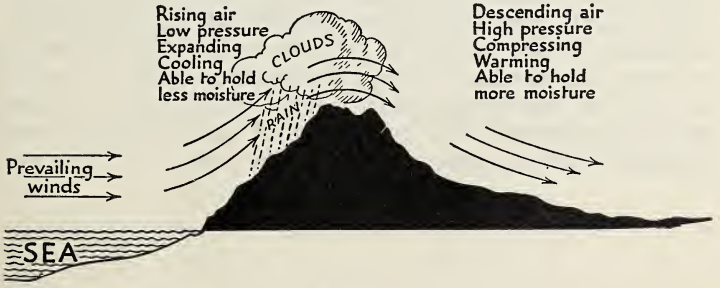
ing down the slope of a mountain. As they are subjected to higher pressure they warm rapidly and cause a marked drying effect on the areas over which they blow.

Some winds are incidental to the passage of a cyclone. Air from the warm south-east blows towards the centre of a cyclone in summer. Such winds bring what is known as a 'heat wave' to central North America, between the Rockies and the Appalachians. In winter, such winds are less frequent in Canada but when they do blow, they bring a 'thaw'. In winter, air from the north-west, moving to the centre of a cyclone, causes blizzards in North America. These streams of cold air sometimes reach as far south as Texas.

(v) The presence and direction of mountain chains.

Mountains, because of their altitude, have an effect on climate. Winds, by blowing from warmer or cooler areas, by dropping or by absorbing moisture, have a great influence. Each, by itself, is a factor in determining weather conditions; and when the relation of one to the other is considered, the result, while simple, is of vast importance.

Mountains and highlands often change the direction of winds and prevent them from blowing in certain protected places. The Alps and the Apennines shield the Mediterranean Riviera from the cold north winds, thus making it the winter 'summer-resort' of Europe; while Maine, in the same latitude, is snow-bound for five months in the year. The Himalayas cause northern India to be warmer than parts of China in the same latitude; Delhi, with its January temperature of 58°, is in the same latitude as, and has a higher altitude than, Hankow, whose January temperature averages 39°.



RAINFALL

This diagram explains why rainfall is heavy on the windward side of mountains and light on the leeward side.

Apart from cyclonic storms and the doldrum areas, mountains are the chief cause of rainfall. When a wind reaches a mountainous region the slopes force it to rise, to expand, to cool, and to precipitate its moisture; if no mountain is encountered much less rain will fall. Rainfall is heavy on the British Columbia coast and light on the Canadian prairies because the mountains lie at right angles to the Westerlies and force them to rise. The western countries of Europe and most of the great plain on the other hand, are blessed with moderate, but sufficient precipitation because there are no mountain barriers in the way of the prevailing Westerlies. The Sahara is a desert because no highlands force the Trade winds to rise, yet the same Trade winds help to cause floods in the valley of the Amazon.

(vi) Ocean currents

The effect of ocean currents on climate is largely dependent on the direction of the wind. If the wind blows from the sea to the land, the effect is marked; if, however, the wind blows from the land to the sea, the effect is not nearly so great. The warm Gulf Stream flows along the Atlantic Coast, but the winters of New York are colder than those of the coast of British Columbia which is farther north. An explanation and brief description of ocean currents is given in the next chapter.

(vii) The presence of forested areas

Forests are largely a result of climate rather than a cause. However, in many areas forests have been cut and this has had a noticeable effect on climate. Ground water that has come from a distance or that has remained underground, is brought to the surface, after the melting of winter snows, by trees and deep rooted plants. Once these are destroyed, moisture remains deep in the soil. It cannot help to provide the rainfall that might be expected in summer seasons in that area or areas towards which the winds are blowing. A large forested area tends to modify temperatures also by transpiring, that is, breathing water vapour into the atmosphere. This evaporation of water keeps the area relatively cooler in summer and warmer in winter.

EXERCISES

1. If you should climb a high mountain what instrument could you carry with you that would give you a fair idea of the height of the mountain? What would be the probable reading of your instrument when on top of Mount Robson?

2. Why has Quito a more moderate monthly average temperature than La Guaira? Quito is much nearer the Equator than La Guaira and should be hotter.

3. Where, in the northern hemisphere, do you find places with a trade wind climate? In the southern hemisphere?

4. Consult your atlas and make a list of places which should have a monsoon climate.

5. There is a place in South America known as Patagonia. It is cold and dry. What makes it so dry? A strong, dry wind increases the rate of evaporation. Does this factor operate in Patagonia?

6. In southern Alberta warm dry winds, called Chinooks, often blow from the mountains.
   (a) Explain how these winds become dry.
   (b) Explain why these winds are relatively warm.
   (c) What effects do these winds have on the areas they blow over?

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3

LAND AND WATER

THE LAND

THE land is the solid surface of the earth. Loose clay, sand, or gravel covers most of it to a depth which may vary from two or three inches to several hundred feet. This is known as *mantle rock*, and its uppermost part is *soil*, which consists of tiny fragments of rock and decayed vegetable matter called 'humus'. These two substances occur in many different proportions and so we have various kinds of sandy clay, and loam soils, each of which is well suited for one type of agriculture but is comparatively useless for another. Apple orchards, for instance, thrive on loose, porous soil but do not flourish on the rich black loam in which wheat does well.

Underneath the mantle rock is solid rock which probably extends to the very centre of the earth. It appears in a great many forms, all of which may be grouped in three classes according to the way in which they came into existence. They are: (1) *igneous*, (2) *sedimentary*, (3) *metamorphic*.

Igneous rocks.—Ages ago the earth probably consisted of molten material, and today its central part would be molten if it were not under tremendous pressure. Rocks which were formed by the cooling of this molten mass are called igneous (Latin, 'fire') rocks. Granite, basalt, and lava are the best examples.

Sedimentary or stratified rocks were made, as the name suggests, by the cementing together of sediments. Wind, water, and ice wear away rocks and carry the waste material to lower areas. Additional layers are deposited at frequent intervals, and in time the huge mass exercises such great pressure on the accumulated sediment that it becomes layer upon layer of rock. Sandstone was thus made from sand, shale from mud, and limestone from the secretions of sea animals.

Metamorphic or changed rocks are the result of some change brought about by heat or by pressure, or by both, in igneous and



Courtesy Miller Services, Toronto

BRYCE CANYON, UTAH

The picture shows riders on the trail at the floor of Bryce Canyon in Southern Utah. Towering above stands a huge knife-like formation, a long, slender ridge of wind eroded rock, pierced at a number of places by large openings. This is the famed Wall of Windows.

sedimentary rocks. They appear in layers and are so very hard that they are not easily affected by weather. Regions where they are plentiful are of little value for agriculture. Gneiss, mica-schist, and slate are examples.

Distribution of land.—Only about one-fourth of the total area of the earth is land, and two-thirds of this land is in the Northern Hemisphere. Western Europe lies near the centre of the land mass of the world and is adjacent to one and less than a three-thousand mile journey from each of the other continents except Australia and uninhabited Antarctica. The Northern Hemisphere contains most of the world's people, most of its wealth, and most of the great nations—chiefly because it has most of the world's land.

Surface features.—The land surface of the globe is irregular, varying from 30,000 feet below sea-level, in both the Pacific and Atlantic oceans, to 29,000 feet above sea-level at the top of Mount Everest. Between these extremes are found a wide variety of relief features, the more important of which are classified as *plains*, *plateaus*, and *mountains*.

Plains are the low, level lands of the earth. They are 'low' and 'level' only in comparison with their surroundings. The great

central plain has an altitude of 3,438 feet at Calgary, with a gradual drop to 772 feet at Winnipeg. Parts of the Atlantic coastal plain are only a few feet above sea-level. Many plains are blessed with a favourable climate, and are well adapted for agriculture, hence it is not surprising to find most of the people of the earth living upon plains. The great north European plain, the plains of the Ganges, the Yangtze, and of the Nile illustrate the influence of relief upon mankind, politically, industrially, and commercially.

Plateaus or **table-lands** are high in comparison with their surroundings and have numerous summit areas. They may be several thousand feet above sea-level, as the plateau of Tibet, or merely a few hundred feet, as in the Columbia plateau. Plateaus are cooler than the adjacent lowlands, and in tropical regions provide pleasant living conditions, and permit the production of temperate-belt crops. Some of the world's plateaus, however, are cold and dry and support only a scattered population.

Mountains rise sharply above their surroundings and have small summit areas. They act as climatic barriers and are the source of valuable minerals, timber, and water-power. They are used for recreation purposes, but often place formidable obstacles in the way of settlement and communication. As a rule they are sparsely settled, yet from such areas have sprung some of the great races of the world.

Changes in the form of land.—The form of land is constantly undergoing change through the work of many agencies. Among the more interesting of these are winds, water, ice, crustal movements, and volcanoes.

Winds carry sand and dust from one place to another. A single storm in the desert may move millions of tons and, in the same way, hundreds of Canadian prairie farms have lost much of their fertile top-soil. Sandbanks along the sea coast are blown away. Many localities are thus being eroded, but, on the other hand, the material carried away is deposited somewhere else. Some of it, near the coast, falls into the sea and helps to raise the ocean-bottoms. Elevations of wind-blown sand, known as *dunes*, are common throughout the drier parts of North America.

Much of the sand thus blown about is of little use for agriculture though it has been found that trees, particularly the pine, may be grown successfully in it. Ontario has experimented in reforesting such areas with good results. *Loess* soils are the result

of wind deposits. Loess is a greyish loam, and, when well-watered, is very fertile. It is common in China, along the Rhine and Danube rivers in Europe, and, to a lesser extent, in the basins of the Mississippi and Missouri.

Water in its various forms changes the surface of the land to a much greater extent than do winds. The work that it does is termed erosion, a word which means eating away. Rain washes soil into streams leaving small channels and gulleys behind. Rivers and smaller streams cut out channels for themselves to depths of as much as several hundred feet, especially when flowing through areas of deep, rich soil. The Peace River and most of its tributaries are known as 'cutbank' rivers because their banks are almost perpendicular for considerable heights. The eroded sediment is carried down stream, if the current is rapid, and deposited at the river's mouth where, in process of time, a *delta* is built up. The quantity of soil thus moved is enormous. It has been estimated that 'in one year the Mississippi River carries to its mouth more than four hundred million tons of sediment—the equivalent of nine hundred daily trains of fifty cars, each loaded with twenty-five tons'.

Oceans alter their shore-lines by the effect of waves, currents, and tides.

Ice, formed by the freezing and expansion of water in rocks, tends to split the rocks apart. Soil, under similar conditions, is often heaved up and more easily eroded later on. When ice, on rivers and lakes, breaks up in the spring, soil and stones to which it was frozen may be floated down stream.

In most mountainous regions there are areas where snow lasts throughout the year. In time, this snow becomes very deep; and its weight and pressure turns much of it into ice; when the amount of ice becomes great enough it begins to move very slowly downhill, when it begins to move it is a glacier.

Glaciers are the birthplaces of many rivers; they erode the land over which they flow and deposit rock and soil on the lower levels; they form lakes by eroding basins or by dropping material across a valley and thus forming a dam. The Great Lakes, as well as many others, were shaped in this way.

Crustal movements or changes in the earth's outer crust may appear as earthquakes and landslides causing great and sudden damage. They also take another form, so slow as to be recognizable only over long periods of time. These result in a sinking



Courtesy R.C.A.F

An Aerial Photograph of a Great Arctic Ice Cap

or a rising of parts of the coast-line or in corresponding movements of the ocean-bottom. When the land sinks, valleys are flooded by the sea and form long, narrow inlets, such as are common on both east and west coasts of Canada. A rising coast or, what amounts to the same thing, a lowering of the sea-level, produces a regular shore-line with great, sandy beaches and an absence of capes and islands. The Atlantic coastal plain is a good example of this.

A volcano is a vent, or opening, in the earth's surface from which come molten rock or *lava,* ash, steam, and certain gases. We usually think of a volcano as occurring on a mountain-top, but it would be more accurate to say that it builds its own mountain. The molten lava which is thrown out forms a cone, and this cone

increases in size with each eruption, until it assumes vast dimensions. The hollow top of the cone is called a *crater*.

The eruption of a volcano may be compared to the bursting of a boiler. Heat from the interior of the earth raises the temperature of subterranean water to a point where steam would result if the outside pressure were removed. At the same time the surrounding rock is melted. All of this superheated mass presses upwards with tremendous force against the earth's crust. When part of the crust gives way an eruption follows.

Great damage is caused by volcanic eruptions. The story of Vesuvius and the destruction of Pompeii is well known, as is that of Mount Pelée, which caused the death of thirty thousand people in St. Pierre on the island of Martinique. Besides this damage to life and property, eruptions also cause extensive changes in the surface of the surrounding country. When Krakatoa, in the East Indies, erupted, more than half the island on which it was situated disappeared, and the sea is now nearly one thousand feet deep where the centre of the mountain formerly stood; the sound of the explosion was heard in Australia; sea-waves spread to South America; and dust and ashes were literally carried around the world.

THE WATER

The total area of the earth is about 197,000,000 square miles, and 145,000,000 square miles of this vast expanse is covered by water. The water is divided into two classes, ocean waters and continental waters.

The ocean waters consist of the four great oceans with their connecting seas, gulfs, and bays. The average depth of the oceans is about two and a half miles. The ocean floor has a smooth and nearly flat bottom, interrupted by occasional valleys, ridges, and plateaus.

The part of the bottom immediately adjoining most continents is known as the *continental shelf*; it is actually a submarine plain having most of the features of a land plain and may rightly be considered as an extension of the coast lowlands.

Sea water contains about 3½%, by weight, of various salts. Its temperature varies with the latitude and with depth. In equatorial regions the surface waters average about 82° F.; in polar regions about 28° F.; at a depth of 600 feet the average temperature of the ocean is 67°, while at 13,200 feet it has decreased to 35° F.

Climatic influence.—Mankind is indebted to the sea in a host of ways. Most of our rain and snow originates in ocean water, and without it all our lands would be as arid as deserts. Oceans regulate temperature by moderating the winds which blow across them. The January mean temperature at Victoria is 39° F., while at Winnipeg it is 3.5° F.

An aid to health.—Great coast cities are able to dispose of their sewage by conducting it out to sea where it is speedily dispersed by the tides. Only an inland city, such as Chicago, can realize the difficulty and cost of sewage disposal without the help of the ocean. The sea-coast is one of our great pleasure and health resorts. Thousands of people gain new energy and vigour by a fortnight's holiday at the seashore.

A source of food.—Fish are taken from 'the seven seas', and constitute some of the food of all countries and nearly all the food in some regions. We also secure salt, and indirectly, our potash, phosphorus, and iodine from the ocean.

A bridge or a barrier.—Oceans enable us to carry our commerce at cheap rates. Columbus sailed across the Atlantic and discovered America, and we may still visit any continent more easily and more cheaply by ship than by rail. Most of the great cities of the world have been built on or near the ocean shore, and the seas aid in bringing closer together the peoples of different race and country.

On the other hand, for thousands of years, the Atlantic and Pacific oceans were such barriers that people did not dare to cross them. The sea kept many of the inhabitants of Great Britain as permanently in that 'tight little isle' as St. Helena held Napoleon. The seas have kept England safe from her enemies, and have enabled Japan to develop a civilization free from the inroads and hordes of central Asia.

The tides.—The larger movements of the ocean waters are the tides and the ocean currents.

Tides are great waves which rise and fall at intervals of about six hours. They are caused chiefly by the attraction of the moon and the sun. When these bodies attract at the same time, as they do twice a month at the times of the new and full moon, the highest or spring tides occur. When they attract at right angles the lowest or neap tides occur. Tides vary in height from approximately two feet in mid-ocean to as much as fifty feet at the head of some bays.

Those who live by the sea are greatly influenced by the tides. Small boats sail more easily with the tide. Clams are dug when the tide is out. The flood tide clears the beaches, the ebb tide carries the refuse far out to sea. In a larger sense the tide scours out the harbours and prevents silting up of channels, as in the case of Liverpool and New York. Where the harbour entrance is shallow, the ocean liners may enter at flood tide over a bar which ordinarily could not be crossed, as at Bangkok.

Ocean currents are streams flowing along the surface of the ocean. Steady, prevailing winds, such as the Trades, are the chief cause of these ocean rivers. The shape of the continents, the earth's rotation, and differences in temperature are contributing factors. The more important currents are: the equatorial currents in the Atlantic, Pacific, and Indian oceans; the Gulf Stream, the Japan current, the Peruvian current, and the Labrador current.

These currents vary greatly in width, in depth, and in their influence. The best known and the strongest is the Gulf Stream. It has a depth of over 2,000 feet, a width of 90 miles, and a velocity of 5 miles an hour as it passes through the Florida Straits. As the Stream flows northward along the coast it soon spreads out into a broad, shallow sheet of water moving at less than a mile an hour and, driven eastward by the prevailing Westerlies, it becomes the Atlantic Drift. The winds, blowing over this equatorially-warmed water, pick up some of its heat and so bring to the coast of Europe more warmth than the winds blowing across the Pacific bring to our own continent. This is one reason why the northern areas of Europe have made greater progress than regions on the same latitude in North America.

The equatorial currents are caused by the Trade winds constantly blowing surface water in one direction. These currents at first blow towards the west but, when they come in contact with the continents, are deflected north and south. Later they are turned eastward and finally return, in a great whirl, nearly to their starting point. The Gulf Stream is part of the Atlantic equatorial current turned north by coming in contact with the coast of Brazil. The Japan current is the Pacific counterpart of the Gulf Stream. It is turned to the north by the continent of Asia; after passing Japan, it swings to the east and approaches close to the coast of Alaska and British Columbia, where it lessens the cold of winter.

A constant movement of warm water from the Equator and towards the Poles means that a return supply is necessary. It is found in the Labrador current which creeps from the Arctic

Ocean, down along the east coast of Greenland to the shore of Labrador, the Maritime Provinces, and the New England states. Its presence explains the damp, cold, winter climates of these regions as well as the dangerous off-shore fogs. Winds from the east carry cold and dampness to the land; south winds, warm and moisture-laden, meet the Labrador current, their moisture is condensed, and fog results. The danger is increased by the presence of icebergs which are carried south by the current.

The Peruvian current along the south-west coast of South America resembles the Labrador current in origin and in influence.

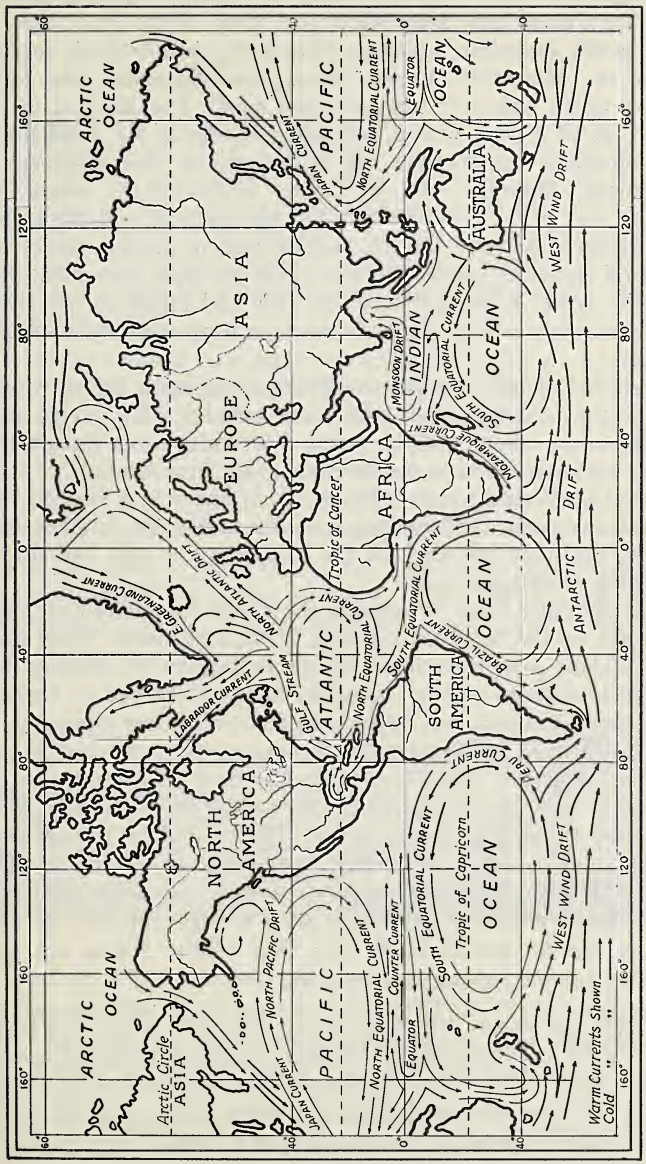
Continental waters comprise the lakes and rivers. These serve us in much the same way as the ocean waters, but there are some important differences. Many cities and towns secure their domestic water supply from nearby lakes and streams. Water furnishes the cheapest kind of power when it flows regularly and descends rapidly. The lakes provide the first requirement and the rivers the second. In every continent we find man drawing away the waters of the lakes and the rivers to irrigate large areas which would else be barren wastes.

A river may be defined as a stream of water flowing across the surface of the land. With its *tributaries* it is called a *river system*, and the total area drained is the *river basin*. Its *source* may be a spring, a glacier, or a lake. The *right* and *left* banks are distinguished by looking down stream. Its *mouth* is where the river empties into the sea, a lake, or another river. In its descent a river may carry vast amounts of sediment to its mouth, thus forming a *delta*.

The value of rivers.—The list of rivers' gifts to man is a long one. By erosion valleys have been deepened, widened, and lengthened, and with the sediment thus secured new areas of rich soil have been built up in the form of deltas and flood plains. The lands of the lower Fraser, the Mississippi, the Nile, the Yangtze, and the Ganges rivers are few of the many illustrations that might be given. The most densely populated areas in the world are found in river valleys.

Rivers serve as boundaries between nations and between provinces or states within a country. The St. Lawrence lies between Canada and the United States for part of its length just as the Ottawa is the boundary between Ontario and Quebec.

Many streams are used by man to carry on trade. The Amazon is navigable to ocean vessels for over two thousand miles, and such



THE OCEAN CURRENTS OF THE WORLD

rivers as the Mississippi, the Rhine, the Hudson, the St. Lawrence, and the Paraná are in constant use. Many of the great cities of the world, including London, New York, Hamburg, Liverpool, Glasgow, Marseilles, Buenos Aires, and Shanghai, are found where ocean and river transportation meet. The junction of two rivers or of a river with a lake often results in the development of important communities, as is evident on this continent at Winnipeg, Montreal, and St. Louis. Hydro-electric power, the 'white coal' of the twentieth century, has rendered possible a great expansion in industry and has enabled man to develop timber and mineral resources which otherwise could not have been used. Most electric power is secured from the falls and rapids in our rivers, and Canadian industry depends almost entirely upon hydro-electric power.

British Columbia would have little or no salmon fishing without the Fraser, Skeena, Nass, and lesser streams. The Volga gives caviar to the epicures of the world. Our great rivers furnish both fresh water and food to the dwellers along their banks.

Logs are floated to saw-mills on rivers; fine gold is washed from river-bars; water, for irrigating orchards and fields, is taken from rivers; also they are used for the disposal of sewage and for the draining of adjacent land.

On the other hand, by erosion, rivers tear out gullies and gorges and pile up the debris as sandbars in their channels. They cause loss of land and, sometimes, vexatious disputes by shifting their channels and so altering boundary-lines. They act as barriers; even a small stream may bring your automobile trip to an end.

Floods may cause extensive damage to property and to life. The Hwang-Ho, 'China's sorrow', has been responsible for the death of millions of people by drowning, or by famine which followed the destruction of crops. The cost of protective levees along the Mississippi has been enormous; and to this cost is added the loss sustained when these levees prove inadequate. Yet these same floods distribute layer upon layer of sediment over the flood plains, the fertility of which they thus renew. Rivers are good friends but very dangerous enemies.

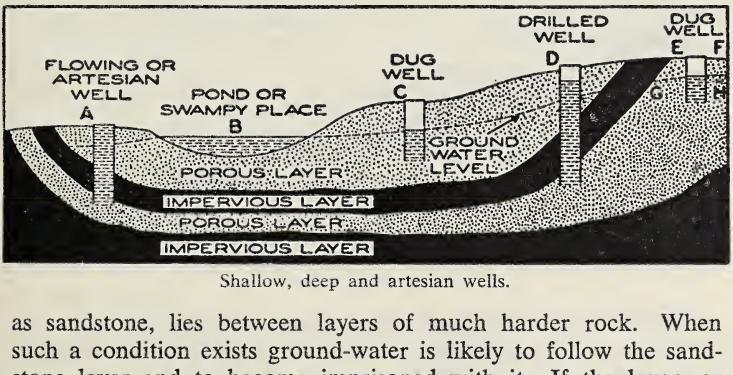
Lakes are inland bodies of water. They are usually fresh, but may be salt. The salinity of Great Salt Lake, for example, is due to the fact that it has no outlet, and the dissolved salts, brought in by the streams, remain as the evaporation continues. The evaporation is greater than the amount of water supplied by the in-flowing streams, and the lake is much smaller than it was

several thousand years ago. Some lakes vary greatly with the seasons. Lake Chad in Africa has an estimated area of 40,000 square miles in the rainy season, but dwindles to 6,000 square miles during the dry season.

Underground water.—When rain or snow falls upon the land, part returns to the air by evaporation, part flows away as surface water, and the remainder sinks into the ground, where it may sink as far as there are cracks or crevices in the rock. The level at which it saturates the ground is known as the *water-table.* If this is near the surface we have a swamp, or a muskeg, or perhaps a lake; if it is deep the water may travel for a long distance through the rock stratum.

Wells are secured by digging or boring down to the water-table. Springs occur when ground-water makes its way to the surface with a distinct flow; when it merely soaks through we have *seepage.* Springs may be warm or hot, as well as cold, and they sometimes contain important mineral matter. *Geysers* are hot springs which burst forth from time to time with considerable force. It is believed that the water draws its heat from hot volcanic rocks.

Artesian wells.—The rocks in the earth differ considerably in hardness and in the extent that water can soak through them. It sometimes happens, for instance, that a layer of soft rock, such



Shallow, deep and artesian wells.

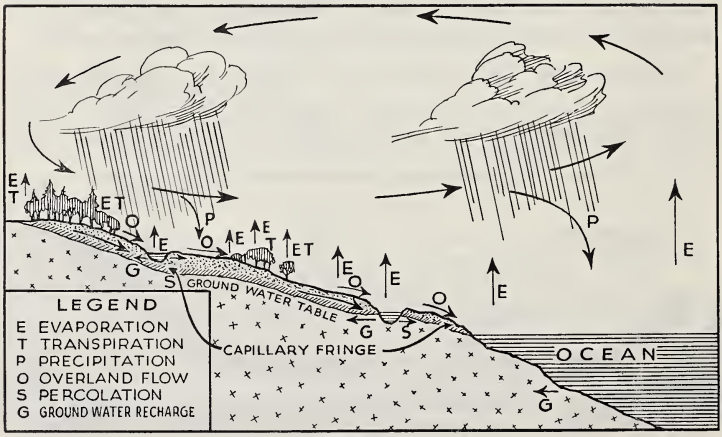
as sandstone, lies between layers of much harder rock. When such a condition exists ground-water is likely to follow the sandstone layer and to become imprisoned with it. If the layer, or stratum, dips downward, as from a hill to the plain below, the water follows it and comes under the pressure of all the water behind. This pressure is so considerable that, should the lower water find an opening, it will be forced upward to a point nearly as high as that at which it entered the ground. Such underground

water areas are known as *artesian basins*; wells bored through the hard upper rock to the water are *artesian wells.*

Such wells are found in almost all countries but are particularly important in dry regions like the Sahara desert, where they support oases, and in central Australia, where the pastoral industries are almost wholly dependent on them.

The water cycle.—Fresh water, air and food are all necessary in our life. We use fresh water for ourselves and our animals to drink. We use it to keep clean and cool. We use it for our crops, for power and in all kinds of industry as a solvent in chemical reactions.

All the fresh water we get comes to us as rain, snow or dew. What is not used or returned to the air moves on to the oceans. From the oceans and other bodies of water, there is evaporation into the air which produces more rain. The movement of water from the oceans, to the air, to the land, and back to the oceans, is called the *Water Cycle.* The story is best told in a picture.



The water cycle

The picture shows us how the system is *balanced.* Water cannot be created or destroyed, we have for our use just as much as the system gives us in any one place. We waste water when we disturb the balance and hasten the movement to the sea. We conserve water when we hold it where we can use it.

The way in which moisture is carried from the ocean to the land has been described. Let us look at what happens in any one place.

From the clouds, snow or rain falls. If the air is dry, it may evaporate before it gets to us. Some falls on trees, grass, buildings or land and evaporates back into the air. The rest may escape directly as surface run-off or it may pass into the soil. Surface run-off fills the rivers and lakes and is used for power and navigation but sometimes there is too much and we have floods. It is better to have the water go into the soil where plants can use it, where it fills our wells and the surplus moves gradually, or seeps through the soil to the springs which feed the rivers.

Plants use great quantities of water from the soil. Some, of course, is removed when the crops are taken in or the grass is grazed. Most, however, is returned to the air by a process called *transpiration*. Thus you can see that by evaporation, transpiration, run-off, and seepage there are smaller cycles within the great water cycle. We must know all parts of the story to make wise use of the water available to us.

Cutting down forests or ploughing the soil has, in many places, speeded up the cycle and water is lost by rapid, surface run-off. Conservationists attempt to bring things back more nearly to the natural state. In some places the natural state may be improved for our use. Irrigation carries water from mountain streams to fertile plains and valleys. Artificial drainage disposes of water at seasons when it is not essential and improves the soil so that it can hold more moisture when it is needed.

Engineers who survey, plan, and build works to control water are called 'hydraulic engineers'. They may build lakes, dams, reservoirs, and channels; form a farm pond, or construct a multi-million dollar dam for power, flood control, irrigation and navigation. Through the science of hydrology, they are learning how to keep the water cycle balanced. To do this, they work along with foresters and agricultural scientists, for a forest removed from the headwaters of a stream, or soil unwisely managed, may speed the run-off beyond the control of the most skilled engineer. On the other hand, land unwisely irrigated or drained may be rendered useless.

In the soil, plants root and grow and provide us with food, much of our clothing, and some of our building material. The value of the soil is measured in how well it grows crops and forests. Yet the soil is not just the crust on the earth's surface. It is, itself, the result of plant growth and the watering action of air and weathering action of air and water.

Some differences in soil, which can be observed plainly within short distances, are due to differences in the mineral material on

the earth's surface. The main differences in the soils of the world, however, are due to differences in climate and the kind of vegetation. Crops are grown according to the climate and according to the soil which itself is the product of climate and the natural vegetation in an area. The wheat lands of western Canada are a good example. The hot dry summers and just enough rain help to grow good hard wheat. The fertile soils are the result of a dry climate and grass vegetation.

The kinds of farming and the way of life of the people in various regions depends on the climate and the kind of soil. For descriptions of the main soil groups and the way in which they are used, see Appendix, page 645.

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4

SOME PRINCIPLES OF HUMAN AND ECONOMIC GEOGRAPHY

In the preceding chapter, we have made a study of geography as a physical science. But geography is also a social science in that it is a study of Man in relation to his environment. Our study of geography shows us how physical factors such as climate and topography have influenced Man, and the extent to which they have determined the way in which he satisfies his basic and cultural needs. It should also help us to understand how Man has been able to exert a considerable measure of control over his physical environment, where he has made mistakes, where he has learned from his experiences, and how he can best make use of those resources with which he has been endowed. Our study of geography should also show us the great need for conserving those resources which nature has taken thousands of years to supply and which Man can destroy within a few years.

Standard and manner of living.—Your previous study of geography must have already shown you that people in other parts of the world do not live as we do. Compare a picture of an East Indian village with a picture of a modern Canadian suburban district. The difference in the manner of living is at once apparent.

Why is it that our homes and our way of life differ so markedly from those in other parts of the world?

Many people in the world still live at what we call the 'subsistence level'; they get barely enough to eat, their clothing is simple and their homes mere shelters, with none of the conveniences which we regard as necessary. What is it which causes the difference between their way of life and ours?

Standard of living depends upon productivity.—If people are to enjoy a high standard of living, they must produce sufficient for their own use and enough to trade for things they want but cannot produce cheaply. A progressive people produces those things they can grow or manufacture most readily. The favourable climate and rich flat land gives the Prairie farmer an advantage in grain

production. Lack of iron ore makes steel manufacturing costly. So grain growing is the basic industry of this region, and the huge surplus is traded for those commodities the farmer wants. His high living standard is the result of the high production per man and the development of transportation, financial, and marketing systems that make trade possible with other regions. We think of standard of living as being dependent on wages. But high wages can be paid only if the undertaking in which the people are engaged is highly productive, and the products can be readily exchanged for other goods they require.

Factors affecting production.—There are certain geographic and human factors that determine what a people can produce most advantageously. The following are among the most important:

(i) Climate
(ii) Soil
(iii) Power resources
(iv) Raw materials
(v) Conservation
(vi) Markets
(vii) Labour supply
(viii) Capital
(ix) Population density
(x) Reputation
(xi) Government

Each of these will be discussed in turn.

(i) Climate

Climate determines the type and amount of agricultural production. Some products require heat and plenty of moisture; others thrive where it is cooler and drier. Bananas, for example, grow well only in the Equatorial forest type of climate. Many orchard trees are killed in winter if the temperature falls below 28° F. Others will stand much lower winter temperatures. The long growing season of tropical regions makes it possible to use land the whole of the year. In the Ganges basin, for example, wheat and barley are grown as winter crops and rice is grown during the rainy season. In arid regions, little can be grown unless water can be supplied by irrigation. When the land is irrigated, however, the increased fertility of the previously uncropped soil makes possible abundant harvests. The waters of the Nile for thousands of years have provided the necessary water and layers of new rich alluvial soil for the Egyptian farmer.

Climate also affects the way in which people work. Equatorial regions have a climate excellent for growing plantation crops but one which does not encourage human endeavour. It is difficult, except in the higher altitudes, to keep men working hard enough to clear the land and to keep down the lush, unwanted, growth on

the plantations. The more rigorous climate of temperate regions has had more than a small part to play in developing the initiative of the people who live in these lands. The types of climate that best aid development are those that make effort and planning necessary if one is to survive, and yet reward that effort when it is applied. The people of the hot forest regions found existence relatively easy so long as tribal warfare and disease kept population down. The people of the far north have to struggle to exist and have found little time to develop a culture. The initiative for the development of areas unfavourable to human progress has come from the people of the temperate regions, who find it impossible to produce in their own type of climate many of those commodities that make life more pleasant. For example, coffee cannot be produced in the United States although the people of that country are the chief consumers of coffee.

(ii) Soil

Fertile land is necessary for agricultural production. The rich plains of North America provide much of the food for industrial areas in the United States, Canada and Europe. The alluvial soils of the Nile, the Ganges, and the Yangtse have supported large populations for hundreds of years. But soil will not retain its fertility unless Man puts back what he takes out. Farmers who make no attempt to restore that fertility by using natural or artificial fertilizers, and by rotating crops, are often called miners rather than farmers. It is so easy to think only of the present and not of the future; yet that is the mistake so many who gain their living from the soil have made, and are still making. The wise agriculturist studies methods of restoring necessary minerals to the soil by rotating his crops, by engaging to a greater degree in livestock production, and by using chemical fertilizers. The farmer who fails to replace what he has taken from the soil is doomed in time to failure; this accounts for many of the poor farms on this continent, and for the miserable plight of many of those who depend on the land for their existence.

Man's need and greed has also often led him to plough and plant crops in regions of light rainfall, better suited to pasture. Once the heavy grass cover was removed, the rich soil beneath easily blew about or blew away entirely, leaving behind waste land and destitute farmers. Areas where this has taken place on the North American continent are the great 'dust bowl' in the United States and parts of Southern Saskatchewan. In other parts

of the world hill slopes, once forested, have been planted to crops with the result that much of the soil has been washed away, leaving the hillsides barren, as in China.

(iii) Power resources

The amount one man can produce depends largely on the amount of effort he puts into his work. The strong energetic farmer can till a greater area than the weak or lazy one. But a farmer can do far more if he has a horse, more if he has a team, and still more if he has a tractor and other necessary equipment. He is directing the energy of gasoline or fuel oil and, by doing so, is able to accomplish so much more than if he had only the energy of his own body.

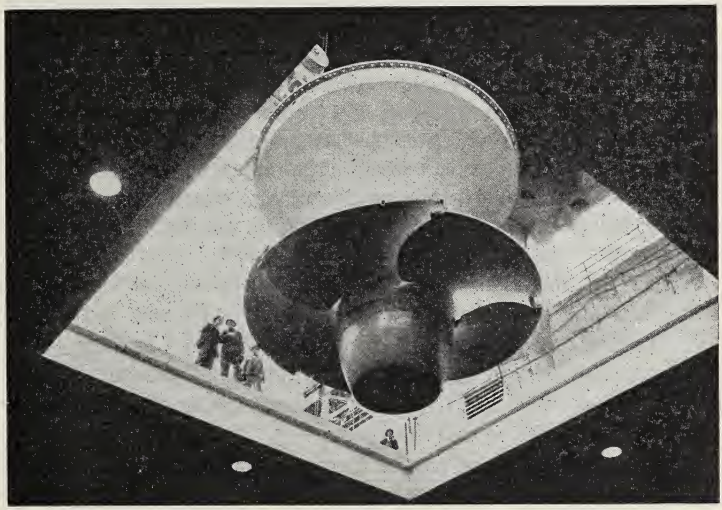
It took thousands of slaves many years to complete the Pyramids. By utilizing the energy contained in electrical power, coal, or oil, a huge modern office building can be erected in months by a small fraction of the number of men used to build the Pyramids. Thus a people using some source of power, such as coal, oil, or water power, can do far more work and produce many times more goods than those who use only their own strength. Power, therefore, is one of the major factors of production, one of the main reasons why a modern progresive people can, though working only 40 to 50 hours per week, produce more goods and enjoy a more comfortable standard of living. Great Britain, during the 19th century, was called 'the workshop of the world'. By developing power from coal, the British people developed steel and textile industries, processing raw materials from other lands which had no such source of power. How has the development of water power resources in Canada and other countries affected Great Britain's economy?

The use of power cuts down on the amount of human physical work required to do so many of the jobs in a modern society; but do not forget that the direction and organization of the human and physical resources, necessary for the development and wise use of this power, require the expenditure of much mental energy and depend on a good educational system.

(iv) Raw materials

Another very important factor in production is accessibility to the source of supply of raw materials. Some raw materials are bulky, and, if transported too far, raise the cost of production beyond competitive prices. For this reason, iron and steel mills

are usually situated at, or near, coalfields, as coal is more costly to transport than iron ore. Cheap transportation and the proximity of iron ore to coal fields have played an important part in the development of the steel industries of Great Britain, the United States, Germany, and Russia.



Courtesy Wheeler Newspaper Syndicate

This huge turbine is being lowered into position in the Fort Loudoun powerhouse, East Tennessee.

Sometimes, commodities can be more cheaply transported in a raw state than when refined. Crude oil and sugar are examples of such commodities. These are usually refined at the port of entry where they must be transhipped. Other commodities such as saw logs are very bulky, and, if possible, are processed before they are shipped far. Automobile parts can be more cheaply shipped than assembled cars. This partially accounts for the number of car assembly plants in Canada and the United States. With the development of power resources in India, Great Britain is losing much of her cotton trade with that country. It would appear foolish to ship raw cotton from India to Great Britain, process it, and ship it back again. But this was done for years and is still being done to a great degree as Great Britain still enjoys many other advantages over India in manufacturing. Can you

explain why the milling of flour and meat packing are the chief industries in the cities of the Great Central Plain of North America?

(v) Conservation

Conservation is a word now widely used in speaking of natural resources. It means the preservation, restoration, improvement, and wise use of nature's bounty. The word conservation is used in federal, state, and provincial laws of Canada and the United States. Most often it refers to the 'renewable' resources: water, soil, vegetation, and wild life, the few great elements of nature.

The 'non-renewable' resources are the minerals: coal, petroleum, gold, iron, and other metals, and building materials of rock or mineral origin. There is only just so much of each of these, and conservation means thriftiness and careful use.

While the sun shines and rain falls, there will be rivers and lakes, soil and crops and wild life on land and water and in the air. Without conservation, rivers can flood in spring and dry up in summer, and the soil can lose its fertility or be eroded. Forests would not continue to give us all the paper, timber and textiles we need, and wild life would disappear.

We cannot emphasize one of the great elements at the expense of the others. There is a balance between them just as there is a balance in the water cycle. In the natural scheme of things, mankind is just one of many partners.

Soils that are eroded by rain or wind have little ability to absorb rain or produce profitable crops. Poor farms upstream and flooded towns downstream often go together. Even in a small area we may see a woodlot cut down, causing a stream to go dry and cattle in a pasture downstream to go thirsty. Or we may remove a hedge or bush that sheltered birds and see our crops devastated by insects which the birds would have eaten.

'Land use' is a subject that deals with the use and management of all our natural resources. In a sense, it is 'applied geography'. Conservation can be defined as 'the use of land according to its capability'. This means cultivation, forest, or pasture only on those soils suitable to them. It means cultivating land in such a way that its natural properties are not destroyed or the land itself not actually washed, or blown, away. Especially, conservation means holding and making the best use of whatever water nature makes available to us.

(vi) Markets

There is little point in producing more goods than a people can use unless the surplus can be sold. Canada produces a surplus of wheat that the crowded countries of Europe need, and, therefore, buy. Though grains are among the chief agricultural products produced in Europe, the people cannot meet their own requirements.

The industrial areas of the eastern United States buy the food products of the central and western states. To make distant markets accessible, transportation and commercial facilities must be developed and maintained. Great Britain's central position on the major trade routes of the world has favoured the collection of raw materials and distribution of manufactured goods.

The home market is important. In the United States, the automobile and electrical appliance industries have a home market of one hundred and fifty million people, most of whom can afford cars and electrical appliances. Manufacturing for this market is on such a large scale that costs of production, in spite of high wages, are very low. This makes it possible for the United States producer to sell in foreign markets where labour costs are very much lower, but where production costs are higher. But do not forget, as many modern governments have apparently forgotten, that goods must in time by paid for by goods, and, if we export, we must be prepared to import. Failure to recognize this all-important principle was one of the major reasons for the depression of the 1930's.

(vii) Labour Supply

The degree of skill of the available labour supply and the cost of this labour are important factors in production. Cheap, unskilled labour has aided the producer in the planting and harvesting of cotton, sugar, and tobacco crops. Cheap labour in Japanese textile mills and pottery factories has made it possible for the Japanese to undersell British and United States manufacturers of similar goods. But skilled labour is often cheaper than low priced unskilled labour, when measured in goods produced, because of its greater efficiency. The operator of an expensive agricultural machine on a Central American plantation may work very cheaply. But if he cannot repair it when a breakdown occurs, this may result in the loss of many hours, and thus he may prove to be an expensive workman. The Canadian wheat farmer, skilled

in the use of modern farm machinery, produces much more wheat per man hour of labour than does the unskilled Indian peasant using primitive tools.

Skilled labour does not mean only manual skill. The skill of the engineer in designing new and more efficient machinery is more important than the skill of the operator. The ability to organize, direct, and supervise the activities of large groups is one of the reasons for the success of modern large scale operations. The foresight and initiative of those who plan and promote the building of railroads, harbour facilities, electrical power and irrigation projects, are most important in a complex civilization such as ours. Without this type of skill we would still do things in the same way they were done years ago; and we would still live under the same conditions, working long hours and receiving little for it.

Much of the economic advance of the people of the tropics is the result of leadership given by people of the temperate regions. Production has been increased, but so has population. Labour is so cheap it is doubtful whether it is worthwhile installing modern machinery where it could be used. In many cases it would create a social problem as the displaced workers would not be able to find other employment.

(viii) Capital

The importance of power resources, transportation facilities, commercial systems, and modern industrial equipment has been stressed. All such equipment, land, and goods used in the production of other goods is known as capital. We often think of money as capital; but it is capital only in that it represents the value of land, factories, or equipment. If we say a man has capital to invest, it means he has sufficient money to purchase all or some of the necessary things he would need to produce or market goods. Before a country such as China can begin to utilize all the physical and human resources that are contained in that vast area, there must be many billions of dollars spent on capital equipment. This must come from the people of China themselves, or from the people outside China who are willing to lend large sums to harness water power, build railways, and develop industries. Most of the people of China are poor and their labour goes into producing goods for consumption rather than in building and equipping expensive factories to produce other goods. The government has been unsettled and there are few wealthy people outside China, who up to the present time,

would be willing to lend huge sums to the government or to build the factories and install the machinery necessary for large scale production. Thus China has been handicapped in that she has found difficulty in obtaining capital.



Courtesy Photographic Survey

Quaker Oats Mills, Peterborough, Ontario, on the Trent Canal System.

In this age, capital is becoming more and more important in production. For thousands of years the chief capital asset of the farmer was land. That is still true today, but modern equipment is necessary also if the farmer is to secure for himself a high living standard. By using machinery he is able to do many times as much as the farmer of the past. The farmer who lacks such equipment finds it difficult to compete these days and has to work long hours for comparatively little. In some cases, co-operatives have provided the necessary equipment for those farmers whose holdings are too small to make worthwhile large investment in such machinery as tractors and combines.

The capital required for some manufacturing industries runs into many millions of dollars. It is easy to see why it is necessary to have financial agencies such as banks, investment corporations, and insurance companies to make available the savings of millions of people for investment in the huge undertakings which are characteristic of a modern economic society. Since they are so necessary to our economic life, people today are much concerned over the measure of control that should be exerted by the government for the most efficient functioning of our society.

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(ix) Population density.

Another factor which affects the standard of living and the production of a country is the density of population. Compare the number of people to the square mile in China with the number of people to the square mile in Canada. Now compare the standard of living of the average Chinese with that of the average Canadian. It is difficult to believe that China or India can ever support their present populations at the standard which we, in Canada, consider desirable and necessary. Research has shown that 2.2 acres of arable land are required in order to produce sufficient food to give one person a desirable living standard. Economists speak of an 'optimum population', meaning the number of people that a region can support at the highest possible living standard. Some believe that Canada would be better off with fifty to seventy million people. This would mean a home market sufficiently large to make possible production on a scale that would keep costs at a minimum. Transportation costs would be decreased as the initial cost of building highways and railroads would be shared by the greater number of people. On the other hand, too dense a population makes it difficult to institute modern methods in primary industries. In China it is cheaper to use the low priced labour than to attempt to modernize the farms. If, however, secondary industries can be developed to absorb those forced from the land, a solution may be found as was done in Great Britain during the Industrial Revolution. This, however, can only be a solution if population in such countries as China, Japan, and India remains stationary and does not increase.

Changes in population are changing world economy. Industrial countries such as Great Britain found it easy before World War I to market their products in new countries such as Canada, Australia, South Africa, and the United States. A young civilization such as Canada first develops the primary industries, agriculture, logging, mining, and fishing. The population at first is insufficient to make manufacturing profitable. It is difficult to compete with the old established factories. But with increase in population and accumulation of capital, this no longer holds true.

The United States became an industrial power early in this century. Canada is rapidly developing her secondary industries, no longer content only to produce grains, lumber, and minerals to trade for machinery, textiles, and other manufactured products. It is true that our large surpluses are still of a primary nature. But as population increases, more and more of these products will be required by the large industrial centres that are so rapidly growing.

Great Britain after World War I found this situation difficult to meet. World War II has made the situation worse and the British people have had to accept cuts in their living standard. Less crude oil is imported as they cannot sell sufficient manufactured goods to pay for it. Only necessary foodstuffs are imported in any quantity, those items that can be classified as luxuries being curtailed. The devaluation of the pound meant that products imported from other countries cost more and British manufacturers obtained less for the goods they sold. Much of this was due to changes in the economy, such as the sale of foreign securities to pay for goods necessary for the completion of the war; but much was due also to the increase in population in Great Britain and in Commonwealth countries, and an increase in the industrialization of countries once her good customers. Germany and Japan faced the same problem. They tried to find a solution by forcing on other peoples an economy that would suit German and Japanese industry, an intolerable situation that could result only in war.

Such problems are difficult to solve, and it is difficult for a democratic government to explain to people the necessity for adverse conditions. Perhaps this is why the imperialistic doctrines of Hitler and Hirohito found so much support. But as we now know, their policies only added to the problems of their own countries rather than solving anything.

Average Population density

Country	*Pop. per sq. mile*
Canada	3
United States	40
France	190
England and Wales	750
Italy	343
China (Proper)	221
India	247
Japan	296
Egypt	Well over 1,000 in Nile Valley

(x) Reputation.

Some countries have built up a name for their products and it is difficult for new countries to break into their markets. Australia, South Africa, and California produce wine; but the well-known wines come from the Mediterranean countries of Europe and are usually asked for. Dresden china, British woollens, Irish linen, and Belgian lace sell readily in our markets. The manufacturer who hopes to sell in competition will have to offer goods

of similar quality at a much lower price if he wishes to gain a part of the market they enjoy. As a result of two world wars, some competing industries did make gains, and it will be some time before European manufacturers can again supply the demand. Every year helps the new manufacturer to gain a firmer foothold, and the consumer to become accustomed to accepting products once regarded as inferior.

A government can aid exporters by strict supervision of their exports so that a good reputation is established. Our government rigidly inspects grain, canned goods, lumber, and other commodities before they leave the country so that Canadian products in other lands will find a ready sale and there will be no complaints about quality. It is the inspecting agency's job to see that when goods are stamped 'Made in Canada', those goods will be accepted without question as to whether or not they are of good quality.

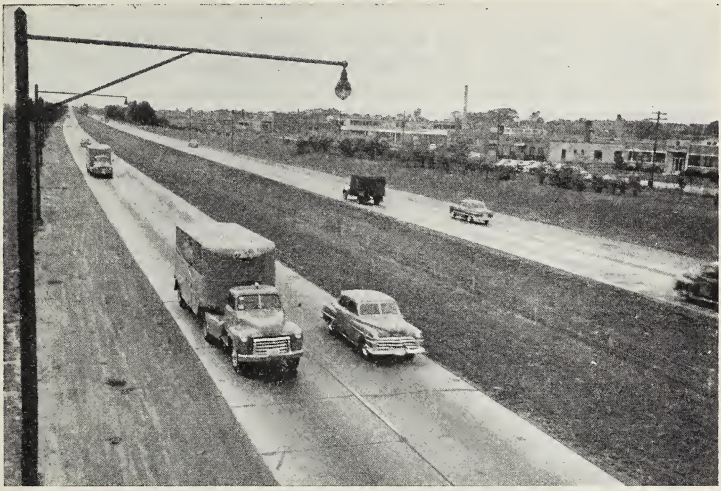
(xi) Government.

At one time protection for the individual and security from invasion from abroad were considered the chief functions of government. But in modern times government activities have been extended into many other fields.

Stability and security are very necessary characteristics of good government. Foreign capitalists are reluctant to invest money in a country where the government is continually changing or where their investment may not be well protected. Such countries have to pay high interest rates on borrowed money in order to make the risk worth while. This all adds to the cost of production and places an obstacle in the way of those who wish to start new enterprises.

In order to assemble raw materials and distribute manufactured goods, transportation and communication facilities must be provided. Government now plays a major part in the development of such facilities. Good roads, railroads, and harbour facilities are usually owned by, or are under the supervision of, government agencies. If government policy in transportation development is too conservative, industries may not be established; if it is too ambitious, taxation may be too heavy and new enterprises may be discouraged. Wise policies in this important field may be one of the major factors to stimulate or to deter a new industry. The pipeline from the Alberta oil-fields to eastern Canada, for example, is absolutely necessary if those fields are to be developed to their

greatest advantage. And government policies, both local and federal, have a great influence on such projects.



Courtesy 'Bus and Truck Transport'

A large transport truck on a well constructed modern highway.

Government is now mainly responsible for education. A good school system trains workers for all types of jobs; it encourages research; it includes the study of production methods and production possibilities; and, above all, it develops good citizens who understand their part in this modern co-operative and complex world. There are reliable studies that show that the productive capacities of regions are in direct proportion to the amount of education received, providing other factors are equal.

Sound financial and trade policies, wise labour and social legislation, efficient law enforcement, and wise administration of justice, all are a part of good government, and all are necessary if a country is to get the most from its natural and human resources.

Summary.—This concludes our brief survey of mathematical, physical, human, and economic geography. If you have mastered these principles, you are now in a position to begin the study of the many countries of the world. You should always be asking yourself 'why?' Why has this region this type of climate? Are the industries of this region the same as industries in similar natural regions and, if not, why not? What factors have aided the industries the people have established? Are they making the most

of their natural resources? Why do they trade or fail to trade their surpluses with us? Your map study and your text will provide you with the answers to many of these questions. Many of the problems may seem impossible to solve, or the solution may be impractical because of the adjustment necessary to bring it about. But though you may be unable to solve these major problems, thinking about them will help you to understand what governments are attempting to do, and that the passing of a few laws is not all that is necessary to make this a better world. You will be in a better position to vote wisely when the time comes for you to do so, and to decide what policies will be best for our country and for the world.

PART TWO: North America

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NORTH POLE
NORTH AMERICA
SCALE
0 200 400 600
MILES
PHYSIOGRAPHIC REGIONS
Arctic Archipelago
Arctic Slope (Northwest)
Hudson Bay Lowlands (Northeast)
Atlantic & Gulf Coast Plains (South)
Canadian Shield
Appalachian-Acadian-Ozark Highlands (East)
Cordillera Plateaus (West)
Interior Lowlands
High Plains
Rocky Mountain System (East)
Pacific Borderlands (West)
D

5

THE NORTH AMERICAN CONTINENT

General Conditions.—When we study the continent of North America we are learning about our home. It is a large and generous home and we are fortunate to be here. During the last hundred years many people have left Europe or Asia and have come to North America to live. What is it that draws so many people to our shores? One answer is found in the following table:

	Area in sq. miles	*Population 1930*	*Population 1948*
Asia	17,400,000	1,100,000,000	1,223,111,000
Africa	11,700,000	133,000,000	175,869,000
North America	8,600,000	165,000,000	192,657,000
South America	7,500,000	82,000,000	101,400,000
Europe	3,776,000	511,000,000	547,730,000
Australia	2,975,000	6,600,000	7,057,000

North America was discovered by Europeans nearly five hundred years ago. At that time our continent was inhabited by a few hundreds of thousands of Indians. To the European of that day, North America seemed to be an almost empty land. There was room for every one. After four hundred years of exploration and settlement, and the natural increase of the population, there are now 200,000,000 people living in North America. A few parts of the continent are becoming thickly populated, a few places are becoming crowded, as in so much of Europe; but North America still has room for more people.

During the years of settlement, countries, states, and provinces have gradually developed. We shall learn through geography how to interpret the movements of the people. We shall find out why the St. Lawrence valley is more densely populated than the prairies; why the Hudson valley is so important, and why New York is such a large city.

PHYSICAL FEATURES

The continent of North America presents a wonderful variety of land forms, climate, and soils, of vegetation and of mineral wealth. The arrangement of the mountain systems has a great deal to do with the shape of the continent. The contour map will show that the highest, longest, most continuous mountain system lies along the western coast. It extends from Behring Strait to the Isthmus of Panama; it is over 6,000 miles long and one of the great mountain systems of the world. These mountains, here called the North American Cordillera, continue as the Andes through South America to Cape Horn.

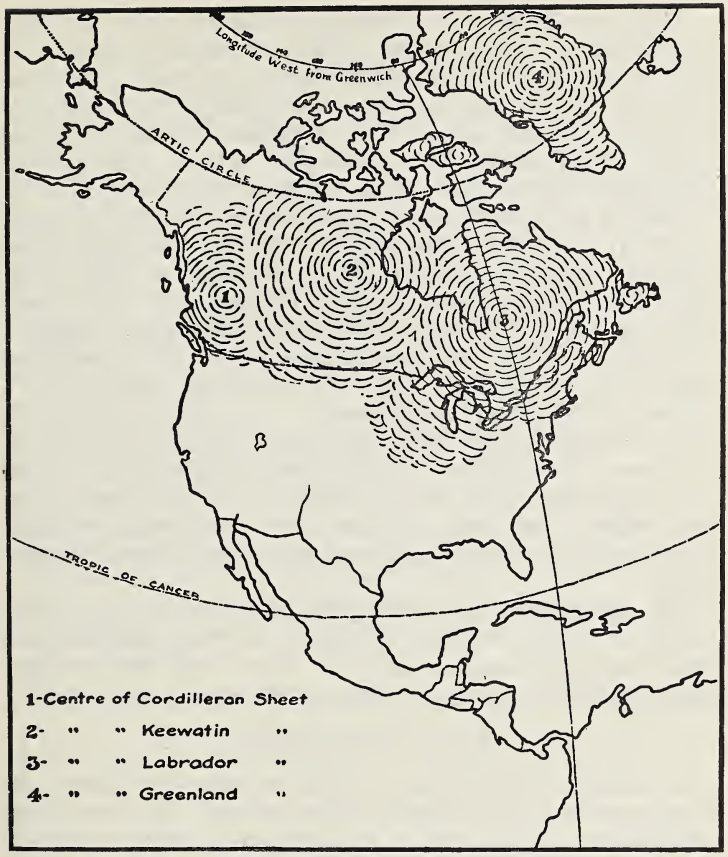
The Canadian Shield

The Canadian Shield is the oldest of all the North American rock formations. It has been more severely glaciated than any other and only the stubs of once great ranges exist today. If the width of the mountains of the Canadian Shield is any indication of their former size, they must once have towered 15,000 feet or more above the seas of that time and age, and some estimates place their summit at over 30,000 feet!

Today we see innumerable rolling hills, broad, shallow valleys filled with water, and the winding streams connecting lake with lake. Nowhere in the world are there so many lakes. It is impossible to show all the lakes even on a large wall-map of Canada. The Great Lakes lie in the southern part of the Canadian Shield; Athabaska, Great Slave and Great Bear lakes lie on its western side.

The Canadian Shield extends in a giant half-circle. Within its great arms is Hudson Bay. The atlas will show how shallow the bay now is. It was once much deeper, and has been gradually filled by the glaciers which tore the old Shield Mountains into pieces and ground them into fine silt. Note the length of the rivers which flow into the bay. For many miles the land around Hudson and James bays is low and swampy. It is filled land, brought down from the mountains that were.

The St. Lawrence River drains the Great Lakes into the Gulf of St. Lawrence, between the Shield Mountains on the north and the Appalachians on the south. The atlas will show the broad estuary of the river below Quebec. It will also show that this estuary was once much deeper and that there is still a main, deep channel by way of Cabot Strait to the Atlantic. The St. Lawrence is the one large river of North America emptying into the Atlantic



This map shows that most of Canada and part of the United States were once covered by a great ice sheet.

Ocean. The St. John River of New Brunswick, the Hudson, the Delaware, the Potomac and many others are small in size compared with the St. Lawrence. However, some of these rivers are of great value to trade, and large cities have grown up on their banks. We cannot always judge the importance of a river by the area of its drainage basin or the length from source to mouth.

The Appalachians.

The map of North America will show mountain systems in the eastern part of our continent, not so high and not so long as the Western Cordillera. These are the Appalachians.

The Appalachians were probably pressed up above the water long before the ranges of the Cordillera made their appearance. It is thought that the Appalachians were once much higher than they now are; that they have been worn down by weathering and a number of glacial ages. They now present rounded ridges and mature, broad valleys. The coastal plain is much wider and the continental shelf is broader than that along the Pacific shore.

Some of the peaks in the Appalachians are 6,000 feet in height, but the average height of the range is much less. The Appalachians consist of a series of parallel folds or wrinkles. A break in one ridge seldom lies opposite a break in the next ridge. As a result there are few easy roadways across the Appalachian highland. Although not at all formidable in appearance, the regularity and number of the parallel ridges have made the Appalachians a serious barrier to trade and commerce. Your history will tell you how the English people settled the Atlantic coastal plain and grew to number over a million and a half before they definitely crossed the Appalachians and poured down into the rich lands of the Ohio valley. One easy route does exist — the Hudson-Mohawk water gap. It is the most important land route in North America today.

The Appalachians in New England resemble, on a small scale, the Coast Range in British Columbia. In New Brunswick and Nova Scotia the mountain ridges are barely 2,000 feet in height. Newfoundland is a detached portion of the Appalachian system.

The Great Central Plain

The Great Central Plain of North America lies between the eastern and western highlands of the continent. It is one of the great plains of the world. It is customary to divide it into the Interior Lowlands and the High Plains. (See page 58). The High Plains continue into the Mackenzie Valley but at a lower elevation.

The plain has three gentle slopes: to the south, to the east, and to the north. The rivers tell us which way the land slopes.

Nearly all of the plain is composed of soil brought down from the highlands on either side. Can you trace the outline where the Gulf of Mexico may have been millions of years ago? The Mississippi River is a drainage ditch emptying into the Gulf of Mexico and it is gradually filling the Gulf. Note the rivers which flow into the Mississippi from either side. All of these tributary streams are muddy, silt-carrying rivers. At the point where the Missouri enters the Mississippi the muddy water can be seen

gradually flooding over to the farther bank. The Mississippi is a clear-flowing stream above this point. It rises in a number of small lakes between the low hills west of Lake Superior. It flows smoothly and quietly through the plain and carries little sediment. The Missouri, or 'Big Muddy', tears down from the Rockies with many another rushing tributary of its own, and pours its silt-laden flood into the central drainage river. This complicates matters for the Mississippi. The plain has only a slight drop. St. Louis is only 200 feet above sea-level. The Mississippi has many hundred miles to travel on its way to the Gulf. As the current slows down, the silt is deposited. The river bed rises, and in the spring freshets the river overflows its banks. So men have built dykes or 'levees', as they are called, to keep the river within its banks. But these are not enough. The silt is ever collecting on the bottom of the river bed, the bed is ever rising, the levees must be built ever higher. Of course, it is a slow process, but what will be the outcome, one hundred, two hundred years from now?

A river which flows through an almost flat plain meanders. That is, it winds and twists and turns. Engineers are hoping to straighten many of these twists and make such a river scour its own channel. Man can sometimes assist nature when he cannot control it. The Mississippi River Basin is the most fertile part of the continent. It could support ten times the number of people who live there now.

The Saskatchewan-Nelson River system drains the central part of the great plain into Hudson Bay. Lake Winnipeg and the two smaller lakes are all that is left of a great glacial lake which scientists call Lake Agassiz. The eastern shore of Lake Winnipeg rests against the rocks of the Canadian Shield. The western shore of the lake is shallow and merges into the flat lands of the plain.

When the great glacier covered the Shield, Lake Agassiz was formed by the melting ice. It probably covered the first prairie level and part of the second level as well. At that time the Red River flowed southward into the Mississippi. As the ice melted the lake eventually found an outlet to Hudson Bay, and today we have the Nelson River dashing down by many a foaming rapid as it traverses the hard bedrock of the old Shield Mountains. It was when the ice melted that the Red River reversed its flow into Lake Winnipeg. The Red River valley is one of the wonderfully fertile regions of the central plain. The lake silt is many feet in thickness and has been ground as fine as powder in the great ice mill of other days.

The Mackenzie River system drains that part of the plain which slopes to the Arctic. The map shows that here the rocks of the Canadian Shield approach the Rockies and the plain is much narrower. A very gentle divide separates the drainage basin of the Athabaska from the North Saskatchewan. The Peace River pours down through the Rockies, and Lake Athabaska resembles Lake Winnipeg. The eastern shore is rocky, the western shore is shallow and muddy.

The Slave River empties the accumulated waters into Great Slave Lake, a water-filled glacial gorge on the edge of the Shield Mountains. Great Bear Lake is similarly situated. There are rapids on the Slave River, but from Great Slave Lake to the sea the Mackenzie River is navigable during the summer months. During nine months of the year the river is either full of floating ice-cakes or frozen over.

The Cordillera

The Cordillera consists of a broken coast range, of an interior plateau, deeply cut and scarred, and of a bold, rocky mountain range sloping down to the plains of the interior of the continent. The northern portion of the Cordillera averages 400 miles in width, enlarging to 600 miles in the United States; but gradually narrowing as it passes through Mexico until it converges in the mountain knot of Popocatepetl. Southward to the isthmus it may be considered a single range.

The Rocky Mountains are well named. They are bare and rugged. They rise gradually from the great plains of the continent but present steep, broken cliffs towards the west. They are the most continuous and well-defined of all the ranges which form the Cordillera of North America. Only one river of any importance breaks through the wall of the Rockies. There are few passes less than 5,000 feet high. Above the 7,000-foot level, the Rockies are generally bare, with towering precipitous faces and sharp crags. Their general height is about 10,000 feet with a width through the base of 80 miles.

Since the Rockies form the main water-parting of western North America, their distance from the sea permits streams draining westward to become large and important rivers. In this particular the North American Cordillera is quite different from its South American counterpart.

The Coast Range extends into the south-western corner of the Yukon and rises to its greatest elevation around latitude 52°

Along the coast of British Columbia, inlets and canals worm their way into the heart of the range, following the troughs which the glaciers have worn during past centuries. The partially submerged mountains north of the Strait of Juan de Fuca are known as the Island Range. South of the Olympics, in Washington, the Coast Range is rather low, with a break at the Golden Gate. Here a flooded valley results in San Francisco Bay, while the Cascades and the Sierra Nevada form the main barrier. A projecting spur gives us Lower California. Through Mexico the mountains give a regular coast-line with few good harbours. Everywhere the Coast Range, or its offshoots, dips down to the Pacific so steeply that there is very little coastal plain from the Aleutian Islands to Panama.

The Coast Mountains, however, have been severely glaciated as far south as the Columbia River. Rivers have also worn gaps through them. These have been used by the railway builders in their search for a gradual and easy gradient through the mountains to the interior plateau. The difficult task has been to find low passes through the Rockies.

The interior plateau lies between the Coast Range and the Rockies. The snows of its mountain rim provide the source-waters of several great rivers. In Alaska the Yukon River drains a basin of 380,000 square miles. In northern British Columbia the Stikine, Nass, and Skeena rivers drain directly into the Pacific through well-worn water gaps. The Fraser, after collecting the waters from 98,000 square miles, empties finally in the Gulf of Georgia. The Columbia basin, 290,000 square miles, extends from the Big Bend to the vicinity of Great Salt Lake. To the south the Great Basin is an area of inland drainage. The Colorado River drains 230,000 square miles through its remarkable 'Grand Canyon', into the Gulf of California. The Mexican plateau is high and, for the most part, arid. The lack of rain and the prevailing heat explain the absence of large rivers seeking an outlet to the sea.

The interior plateau offers every range of climate from the extreme cold of the Yukon valley to the intense heat of the Lower Colorado, and from moderate rainfall to a complete absence of rain, giving us some of the dreariest desert spaces to be found anywhere in the world.

CLIMATES OF NORTH AMERICA

North America has a great variety of climates. The *Arctic* climate of northern Canada has short, cool summers and long,

extremely cold winters. The *Tropical* climates of Florida and Mexico are hot in summer and warm even in the coolest 'winter' months. Between these extremes lies the broad belt of so-called *Temperate* climates which, in the north, are warm in summer and cold in winter and, in the south, are hot in summer and cool in winter.

Rainfall also varies greatly. Northern Canada is a region of little precipitation, especially in winter. South-eastern United States and the Pacific coasts of British Columbia and Alaska are regions of heavy rainfall. The Pacific coastal region falls into two parts, a northern one which has rain both summer and winter, and a southern one with dry summers and a much lower total annual rainfall. Nearness to the sea does not ensure rain when the winds blow from the land.

The inter-mountain areas and the great plains east of the Cordillera have *Continental* climates. The cold of winter comes far south into the Mississippi basin; the heat of summer pushes far into the Canadian north. The rainfall is less than twenty inches in the lee of the Rockies. We shall find that these climatic factors of temperature and rainfall determine what man can do and what he cannot do over large areas of the central plain. Comparing places in the same latitude, the Atlantic coastal plain is much colder than the Pacific coast. Oranges are grown near San Francisco, but they cannot be grown north of Florida. The reason for this is found in the direction of the winds during the winter season. Vancouver Island and Newfoundland are in the same latitude, but the people of Newfoundland cannot grow commercially the small fruits, such as are grown on Vancouver Island; nor will the trees of Newfoundland ever grow to the size of those on the Pacific coast.

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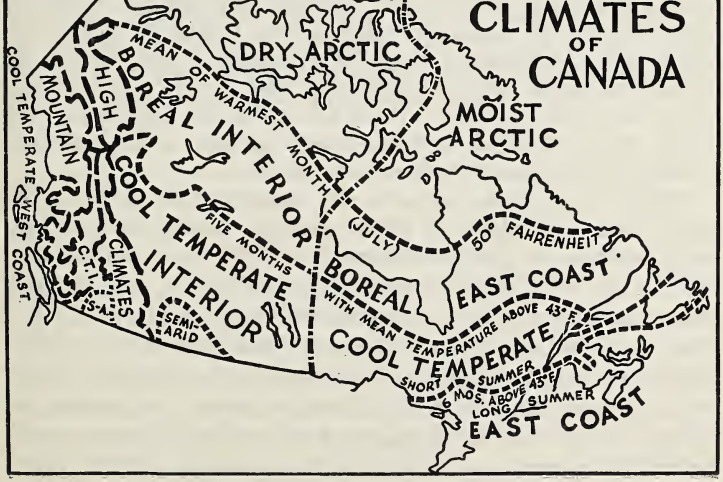
The Canadian Oxford Atlas.

6

CANADA – GENERAL GEOGRAPHY

THE Dominion of Canada was formed in 1867 by the Union of four provinces; Ontario, Quebec, New Brunswick, and Nova Scotia. Since that time, six provinces have been added, and now Canada stretches from sea to sea. It has an area of 3,684,463 square miles and a population of over 14,000,000. It is larger than Australia and almost equal in area to Europe. Canada is only in the beginning of its development. It is a thinly populated country, but a land of many and varied resources and a country of great opportunities.

The climate of Canada is everywhere of that invigorating quality which urges man to his greatest efforts. The cold winters make it necessary to lay by a store of food, fuel, and clothing. The houses must be well built and secure. The domestic animals must be housed and tended during the winter months. These things are the demands which nature imposes on those who wish to live north of the 49th parallel. For this reason, immigration to Canada



has been from those northern European countries where similar climatic conditions prevail. It is also true that some immigrants have found conditions more severe than they expected and many of these have moved into the United States. There has been a constant drift of our people to the United States and this is one reason for the slow growth of Canada's population and the slow development of a national culture.

On the other hand, we Canadians are proud of the fact that we are a strong, healthy, and virile people. We have had time to absorb our immigrants and make them good citizens. We have faith in the future of our country and whether we have ten or twenty millions of population the thing that counts is how comfortable are the citizens who live within our borders. It may be said that there is practically no illiteracy in Canada; almost all our people can read and write. Our school systems, looked after by the several provincial governments, are modelled on similar lines, so that nearly every boy and girl in Canada has tuition provided by the State up to the age of fourteen years. Our colleges and universities are open to all upon payment of fees which cover only a small part of the total operating cost. It would be interesting to make a list of those countries in the world which provide as well for their people.

Resources.—The resources of Canada are many and varied. The fisheries of Newfoundland first brought the European to our shores. The fisheries of the Pacific coast are equally valuable. The great forests of Canada, which once held back settlement in the Maritimes and the St. Lawrence valley and in British Columbia, are today giving us wood products of tremendous value. From the forests we make lumber, pulpwood, and paper, cellulose and rayon, and other products. These are among our leading exports. Let us be sure we use the forest wisely so that we may continue to reap their benefits for generations to come.

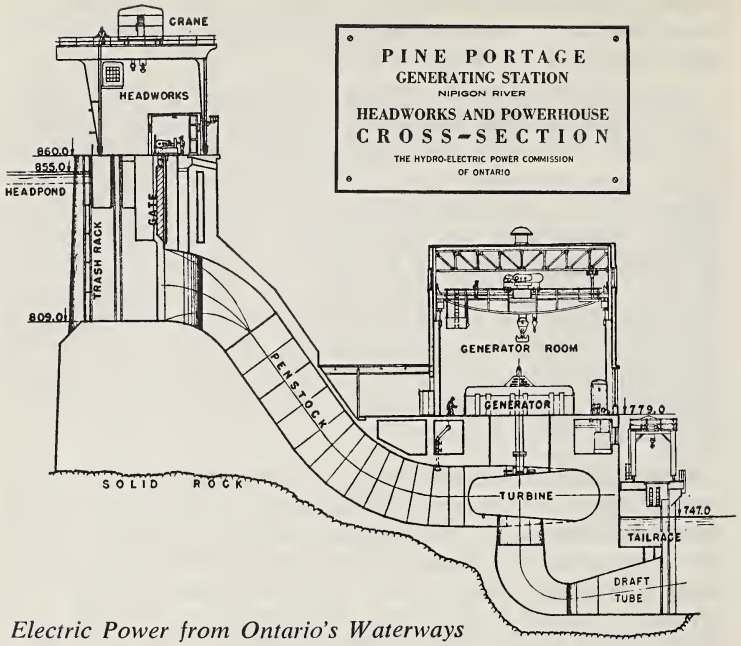
The more important minerals of Canada include gold, copper, nickel, lead, zinc, platinum, silver, uranium, radium, asbestos, coal and petroleum. At present the greatest exporter in the world of base metals, she leads the world in the output of nickel, radium, platinum, and asbestos. New and important deposits of iron-ore and titanium have been found in Labrador and Quebec respectively. In recent years, the manufacture of aluminum from imported bauxite ores ranks Canada second in world output, and during the second World War, development of the mining of mercury ores made this country one of the leading producers of this metal.

Although figures are not available, Canada is now recognized as one of the major sources of pitchblende products which are used in the development of atomic energy.

Coal.—The coal beds of Canada are found in Nova Scotia, Alberta, Saskatchewan, and British Columbia. With an estimated coal reserve of some one hundred billion tons, Canada is at present producing only some 17 million tons yearly. This is accounted for by the fact that our coal reserves are not of the highest quality and are unfortunately located. The densely populated regions where coal is chiefly consumed are Ontario and Quebec. There, the industrial centres are close to the coal-fields of Pennsylvania. To supply these eastern sources with Canadian mined coal would require an expensive rail haul. Perhaps the answer to the problem is the development of industries in Alberta, which many geologists believe to be underlaid by one of the world's richest coal and oil deposits.

Hydro-electric energy has been developed throughout the four natural regions of Canada. This Dominion now ranks second in world development of water power with over 10 million horse power in use from an estimated 52 million available. The development of electrical energy in the St. Lawrence basin is one of the greatest of its kind in the world. Winnipeg draws electricity from the Winnipeg River, while the falls of the Churchill and Nelson Rivers supply Saskatchewan with a reserve of possible electric power sites that may contribute to the future development of that province. Alberta has millions of tons of cheap coal which can be utilized for the same purpose. British Columbia has a potential supply of over ten million horse power, and although one million of that supply is in use, extensive development is under way.

Petroleum.—Among Canada's major imports are crude oil and petroleum products. During recent years, we have been able to supply about ten percent of our own needs from oil wells located, chiefly, in Alberta. The wells of the Prairie provinces bid fair to supply a larger part of the Dominion's needs. Competition with United States oil, supplied by water transport and via pipeline, has limited the market of Canadian oil chiefly to the Prairie provinces. Declining United States reserves of oil, on the other hand, are focussing attention on Canadian fields, and huge sums are now being spent on their development. One of the most significant of these developments has been the completion of the 1,150 miles long pipeline from Edmonton, Alberta, to Superior, Wisconsin.

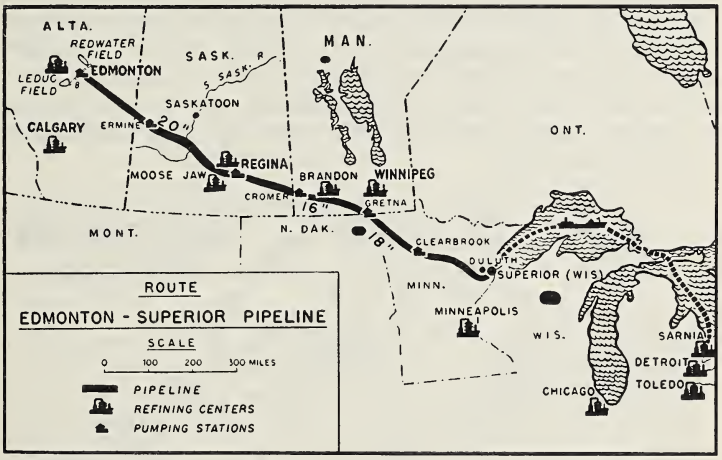


Electric Power from Ontario's Waterways

In the early days of Ontario's industrial history, waterfalls were the source of power used to turn waterwheels which supplied electrical needs of local manufacturers. Today, water pouring over man-made 'waterfalls'—gigantic concrete dams piling up water to great heights—spins the shaft which produces power for every electrical need in a radius of hundreds of miles. The amount of electricity that can be produced is determined by the fall ('head') and volume of water. This cross-section giving a 'sliced open', simplified view of the project shows how a generating station operates to produce electricity. The water takes just a few seconds to complete its power-producing journey which starts at the *head-pond* and continues down 20-foot diameter steel pipes encased in concrete, known as *penstocks. Trash racks* prevent logs and debris from entering the openings. *Headgates* control the water used. Water racing down the *penstock* and through the *turbine* revolves the shaft which sets the *generator* in motion. The *generator*, as the name suggets, produces electricity that flows to the transformers and thence to the switching structure, from where transmission and distribution lines bring it to the point of use. At the end of its course, the water surges through the *draft tube* into the *tailrace* and from there to the river where it may be used again to generate more electricity at another location downstream.

Courtesy Ont. Hydro-Electric Power Commission

The planning of the pipeline was precipitated with the discovery, in 1947, of the Leduc, Alberta, oilfield, when it was realized that the estimated reserves of crude petroleum in Alberta would be increased by 100% within a few years. The first crude arrived at the eastern terminal in December, 1950.



From the terminal in Edmonton, the crude oil flows to Regina, Saskatchewan, and from here passes through intermediate pumping stations to the eastern terminal. From Superior, it is shipped in tankers to the refineries at Sarnia, Ontario. During the season of closed navigation the crude oil is stored at Superior, ready to be shipped on board the tankers during the spring thaw.

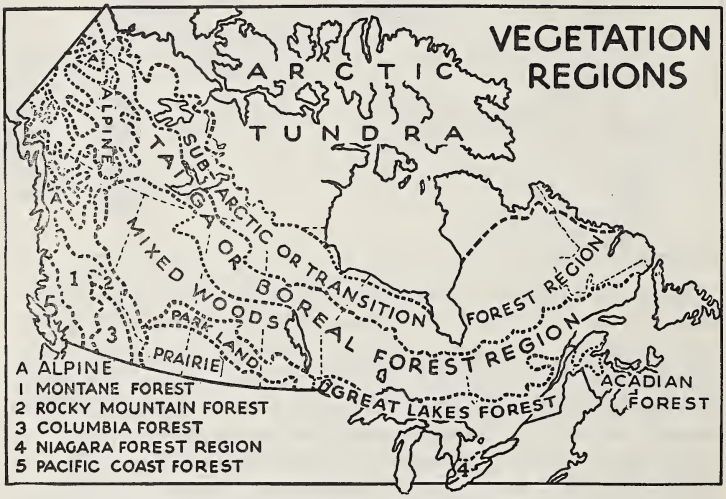
Canada at present is producing only 0.2% of the world's oil supply but uses 3.6% of world production. Further development of oil reserves in Alberta will decrease Canadian dependence on world oil supplies.

One of the earth's greatest known oil reserves is in the bituminous sand deposits at McMurray, Alberta. Over one hundred billion tons of these sands, it is estimated, are ready for development. At present the yield is about one barrel of oil per ton of sand.

Natural gas is used to run factories and to heat and light the homes of thousands of prairie people. Lately there have been plans discussed to pipe this gas to the West coast.

Agriculture is one of the basic industries of the people of Canada. Sixty years ago, over one half of our population was busy

on the farms. Now, with a fifty percent greater output, due to mechanized farming, improved methods, and expansion, only one quarter of the population is engaged in agriculture. European demands for food provide a market for all that Canada can afford to export. We once competed successfully in a world market in the export of wheat, flour, canned fish, bacon, beef, eggs and cheese. We must now determine how much we can export and yet satisfy the requirements of the domestic market. The high prices resulting from this situation are likely to lead to the over-development of certain export industries. An increase in our population would tend to provide a home market as the demands for export decrease.



Manufacturing.—Though Canada is a young country with a small population, various factors have contributed to the development of its manufacturing establishments. The raw materials of the forests, agriculture, fishing, and mining industries are processed here. The topography and ample rainfall have combined to provide catch basins where power can be cheaply developed. Good harbours, navigable waterways and the presence of good passes through the mountain barriers have helped in the building of an excellent transportation system. Highways are aiding the development of motor carriers. Markets for the products of our mills, mines and factories are found in the United States, Great Britain, Continental Europe and Asia. In these countries, the depletion of

the natural resources makes it necessary for them to import such commodities as lumber, newsprint, canned foods, wheat and base metals. The fact that Canadians enjoy a high standard of living provides a sufficiently large home market for many manufactured items. A stable system of government and a modern educational system have given foreign capitalists confidence to invest their money in Canada. Thus there are to be found many modern plants which are branch factories of large parent companies in the United States and Great Britain. Two World Wars accelerated the industrialization of our country and Canada now ranks among the first six nations in manufacturing. There has been a trend towards the concentration of our manufacturing along the St. Lawrence waterway. Difficulties of war-time transportation developed new industries close to the supply of raw materials, power, or the ports of export in Western Canada. Now established, these industries are continuing to prosper, and will, no doubt, in time expand.

Transportation.—In the matter of rail transportation, the people of Canada have more miles per head of population than any other country. It has been a costly venture. Fourteen million people have over 42,000 miles of main track plus some 14,000 miles of second, third, and industrial track. Some people claim we have overdone railway building; but it took the second World War, with its heavy demands on transport, to prove the value of our railway system.

The growing dependence on motor vehicle transport for passenger and freight traffic has created a need for a nation-wide highway network. Already Canada has about 560,000 miles of surfaced and non-surfaced roads; this is only a beginning and provincial governments have already planned vast road making programmes.

In December, 1949, the Trans-Canada Highway Act was passed by Parliament and thus the largest federal-provincial joint project to date was initiated. The Highway will cross all provinces and its total length will be approximately 5,000 miles. It is due to reach completion by December, 1956.

The expansion of air lines in Canada has been rapid since the second World War. Aircraft now play an increasingly important role in the transportation of freight, passengers, and mail across the country. The speedy development of our northern sections is due in part to the extensive use of aircraft. Mining, mapping, forest inventory, patrol and fire suppression, have all utilized this means of transportation in a land which formerly depended on the use of canoe or dog sled.

Native animals of Canada.—The great northland which stretches from the borders of Labrador to Alaska and north to the Arctic islands is a world storehouse of wild animal and bird life. This vast area of over 2,000,000 square miles, wooded in the southern part, muskeg and tundra in the northern part, still supplies the Indian, the Eskimo, and the white trapper with a reasonable living. The moose, the cariboo, the deer, the bear, the wolf, and the fox are hunted in all the Canadian provinces except Prince Edward Island. The sale of hunting permits is a source of income to each provincial treasury. The cougar, mountain goat, mountain sheep, grizzly bear, and wolverine are typical of the Rocky Mountain region. Among the smaller fur-bearing animals of northern Canada are the beaver, muskrat, skunk, lynx, mink, marten, fisher, weasel, ermine, otter, rabbit, and squirrel. On the prairies the gopher and the coyote still persist in spite of the efforts of the farmers to get rid of them.



Courtesy C.N.R.

WILDLIFE
Native deer in one of Canada's national parks.

The only buffalo in Canada at the beginning of this century were a few kept in captivity and a small herd of 'wood buffalo' in northern Alberta. It looked as though this animal would soon be extinct but the action of the Canadian Government in purchasing a herd from a Montana rancher and giving the animals a protected home has assured the continuation of this remarkable species.

At first herded at Wainwright and Elk Island parks in Alberta,

the buffalo have now been transferred to join the wood buffalo in Wood Buffalo Park, situated in northern Alberta and the North-west Territories. It is believed that there are now about twenty thousand roaming through the Park.

The ponds and lakes of Canada are the summer breeding home of millions of water fowl. Strict game regulations are necessary to protect these birds on their way to the breeding grounds from destruction at the hands of selfish and unthinking hunters. By wise game laws, the game bird population is kept up so that in most places there are enough water fowl to allow a limited fall hunting season.

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7

THE CANADIAN SHIELD REGION

THE Canadian Shield is a very extensive upland, underlain by ancient Precambrian rocks, making up half the area of Canada. Geologists state that it is one of the oldest regions in the world, the plateau being elevated millions of years before the Carboniferous Age. During long ages of time, it was gradually worn down and finally scoured off and rounded during the Glacial Age. When the ice finally retreated, it left a slightly elevated peneplain with low, rounded mountains of very resistant rock. Within this area today there are an unbelievable number of little lakes and rivers, with many picturesque falls and rapids. The soil, however, is thin and sandy.

This upland region, from Labrador to Lake Winnipeg, is still in forest and by far the larger part of this vast area will never be anything else. The glaciated section of the Canadian Shield has much rock and little soil suitable for agriculture.



THE PHYSIOGRAPHIC REGIONS OF CANADA

The lumberman follows up the tributary streams from the St. Lawrence valley or the upper Great Lakes. During the winter he cuts his logs and hauls them over the snow to the nearest lake or stream. The spring freshets carry the logs down to the mills, which are located on navigable water or near a railway, where transportation of the finished product is assured. The Great Lakes and the St. Lawrence provide access to the ocean and water transportation to the ends of the earth.

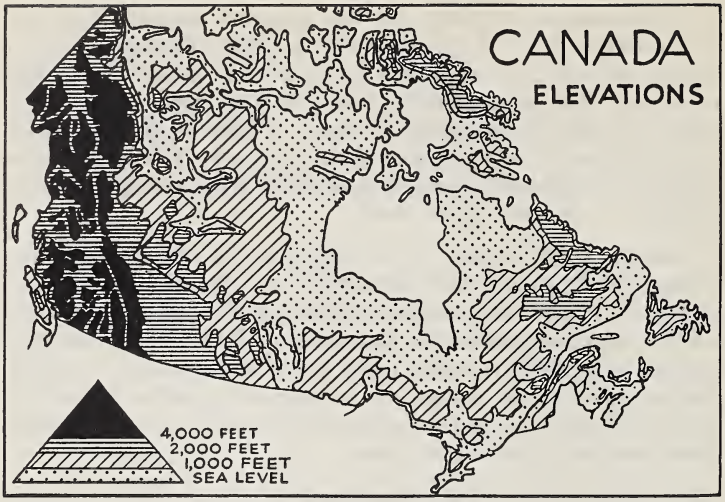
Climate.—The climate of the Shield is one of extremes. The winters are long and cold, although in the dry air the low temperature does not cause as much discomfort as higher temperatures do in a more humid climate. Spring comes late, and the summers are hot. Precipitation in the north is not as heavy as it is in the southern part of the region, the average being about twenty-five inches. The growing season is short, and does not usually permit corn, tomatoes, or apples to ripen.

DRAINAGE

The mighty St. Lawrence drains about 200,000 square miles of northern Quebec, an area equal to that of France. Its three largest tributaries are the Ottawa, the St. Maurice, and the Saguenay Rivers. During the past thirty years a number of strong concrete dams have been built across these streams, thus further increasing the natural storage provided by the numerous lakes. Some of these dams are very large, comparing in size with the great Aswan dam on the Nile. A large volume of hydro-electric energy is developed by this means. Logging is carried on down the long, smooth stretches of the river, where many mills turn out quantities of pulp, paper, and paper products.

The valley of the Ottawa River.—The Ottawa River, and its tributaries, the Lièvre and the Gatineau, comprise one of the most valuable timber areas in eastern Canada. Estimated electrical energy amounts to 600,000 horse-power. Hull and Ottawa stand on opposite sides of the Ottawa River, where the Chaudière Falls mark the head of navigation. They are both busy and growing cities. Hull has a population which is 90% French-Canadian. Here are lumber mills, a mica plant, iron and steel foundries, paper mills, and the largest match factory in Canada. These industries not only supply work for the citizens of Hull, but for many of the citizens of Ottawa, who go across the river every day to their various tasks.

Below the falls the valley of the Ottawa widens out, and the



river flows in a leisurely manner across the lowlands to the St. Lawrence. Near Montreal Island there are rapids, but the Grenville Canal and one at Ste. Anne permit the passage of scows and small river boats.

The St. Maurice River flows through a rough, rugged country until it precipitates itself turbulently over Shawinigan Falls. Its banks are high and terraced, and almost as imposing as those of the Saguenay. Power stations have been built at a number of places, the best known being those at La Tuque, Grand'Mère, Shawinigan, and La Gabelle. Pulp or pulp and paper mills are located at these points. More than half the paper manufactured in Canada is made in Quebec. Few rivers can equal the St. Maurice in the total amount of electrical energy developed.

Shawinigan Falls (26,000) is the largest city on the St. Maurice. It is situated at a point where the river plunges over the southern edge of the plateau. The city contains a remarkable number of manufacturing plants, and is a veritable hive of industry. There are chemical works, aluminum works, a carborundum plant, cotton mills, a pulp and paper mill, carbide works, and a factory of Canadian Industries Limited. This company has a varied output, one of its most modern products being cellophane. **Grand'Mère** is 10 miles upstream from Shawinigan, and possesses a large paper mill, as well as manufacturing plants where clothing, boots and shoes are produced. **La Tuque** is 114 miles up the

St. Maurice, and has a hydro-electric development and a pulp mill. Trappers bring their furs here, and hunters and anglers set out from this point for the northern woods.

The Saguenay River, draining Lake St. John, flows in a deep, glaciated trough between towering cliffs. It is navigable as far as Chicoutimi. There are thirty miles of riverway between Chicoutimi and Lake St. John, and large power plants have been erected at Ile Maligne and Chute-à-Caron. In 1950, power developments on the Saguenay River amounted to 1,950,000 horse-power. This energy runs the pulp mills at River Bend, Port Alfred, Kenogami, Jonquière, and Chicoutimi, and also the important aluminum works at Arvida.

During the second World War, an enormous dam and power plant, known as Shipshaw No. 2, were built on the Saguenay, making available 1,200,000 more horse-power for the industries of the Saguenay Basin. This plant and that at Beauharnois on the south shore of the St. Lawrence near Montreal are the two largest power plants in Canada.

Baie Comeau, on the north shore of the St. Lawrence, 200 miles east of Quebec, is an excellent example of the newer paper mill towns. Its mill has an annual output capacity of 115,000 tons. Its entire output is shipped to the United States. Around the mill has grown up a miniature city with a population of 4,000.

Along the north shore of the St. Lawrence, from the mouth of the Saguenay River to the gulf, are tiny, isolated fishing and lumbering villages. Life here is difficult, particularly in the fishing villages. Hemmed in between the rocky, forested hills behind, and the river before, the people who live in these villages are almost entirely dependent for their livelihood upon fishing and trapping. The women try to add to the scant family income by making hooked rugs and carpets to sell to tourists who, during the summer, come ashore from the boats touching at these north-shore points.

Hydro-electric development.—Since the lowlands have no de-deposits of coal, it is fortunate that the presence of many lakes and waterfalls makes development of water-power possible and cheap. During the last ten years, the provinces of Ontario and Quebec have made remarkable advances in the development of water-power, almost doubling their installation. Quebec has the largest amount of available water-power of any province in the Dominion, almost twice as much as Ontario. Moreover, she has

about one and three-fifths times the hydraulic installation of Ontario. Quebec's total installation is now over 6,135,737 horse-power, and it is believed that with careful conservation by storage dams, a development of 17,000,000 horse-power may be anticipated.

The forests.—Mention has already been made of the vast forest regions which Jacques Cartier must have seen as he sailed up the St. Lawrence in 1535. Coniferous forest stretches for miles on end over the greater part of the Laurentian Plateau, interrupted here and there by ledges and rounded hills of bare rock. By far the greater part of this forest is still Crown land, administered by the provincial governments. Lumber companies pay for the right to cut timber on long-term leases. As there is great danger from forest fires, it is necessary to provide forest rangers to safeguard this source of national wealth. Hunters and campers must obtain written permits before they can enter the forests. Canada has much to learn from older European lands about forest conservation and reforestation, and at the present time steps are being taken to protect the great stands of Canadian timber which would otherwise be depleted with little promise of restoration.

During recent years, the Quebec Government has done much to conserve its forest resources. The public and the farmers are being educated to preserve and improve the heritage of their forests, and tree planting ceremonies by school children and other groups are being encouraged. At Duchesnay, in Portneuf County, the Government has opened a school of Forest Protection, the first of its kind in Canada. From the nurseries at Proulx and Berthierville, young trees can be obtained for reforestation, while in the Entomological Bureau, forest insect pests are studied and means of destroying them devised. The Regional Forest Protective Associations work under Government direction to prevent and control forest fires.

In these forests, trapping, logging, and mining are the only possible industries. For a number of reasons farming is difficult in this region. The climate is harsh, the winters are long and cold, and the precipitation is scanty, averaging about twenty-five inches. The soil is thin and poor, although there is a stretch of level land covered with clay loam around Lake St. John. Here, for generations, French *habitants* have tilled their farms and produced grain, hay, vegetables and small fruits.

Still further north, the regions around James Bay and east of Hudson Bay are practically uninhabited. A few hunters and

trappers lead a precarious existence; white men are found at Hudson's Bay Company posts, Royal Canadian Mounted Police posts, at meteorological stations, like Port Chimo, and at the few prospecting sites for minerals such as coal, gold, and copper. There are also the native inhabitants: Eskimos in the north and Indians further south.

Both Eskimos and Indians are under the care of the Federal Government and in recent years much has been done to improve their lot. Hunting and trapping by white men are forbidden on their trapping preserves. Several areas have been stocked with beaver and muskrat and the Indians have been taught how to conserve wild life. Schools and hospitals have been opened in the larger settlements, and the use of the radio and the aeroplane has made it possible to bring patients to hospitals further south, or to take doctors and nurses to the native villages.

The search for minerals, particularly during the war years, has uncovered untold wealth in this bleak northern land. But more of this later!

Wood-working factories.—The manufacture of raw lumber into finished articles has gradually grown up near the sources of supply. Hardwood lumber is used in constructing furniture, pianos, organs, carriages, wagons and agricultural implements. The chief hardwood sawn today is yellow birch, which is extensively used for flooring. Other woods are hemlock, jack pine, red pine, and spruce, which are used for building. Ties, shingles, lath, hoops, staves, and veneer for baskets, doors, furniture, and plywoods are also produced. Modern builders and furniture makers use plywood and various forms of paperboard extensively. Plastics too are being developed to meet a multitude of needs.

Pulp and paper.—The last thirty years have seen a tremendous output from the pulp and paper mills in the St. Lawrence valley. Today, Canada leads the world in the production of newsprint. The reasons are not hard to find. Much of the Laurentian forest is small in size for saw-timber, and as one approaches the height of land, spruce prevails over all other species, and spruce makes excellent paper. There is, then, a vast area of spruce forest suitable for the pulp and paper industry.

Mills have been located at points where large areas can be secured for perpetual production. Large pulp or paper mills are expensive undertakings, the necessary capital running from five to twenty millions of dollars. It is therefore good business policy for

the milling company to acquire a large tract of forest so that there will be a constant supply of pulp logs for the mill.

In eastern Canada some of the older timber limits have been so carelessly used that they can no longer be operated at a profit. In consequence, new locations for pulp mills are being sought, and towns such as Terrace Bay and Marathon, on the north shore of Lake Superior, are being built in the forest.

Pulp mills require a large amount of electrical energy, and much water for washing pulp. This is supplied by the streams which dash down by waterfall and cataract from the glaciated Canadian Shield. The numerous lakes supply a steady run-off, which in turn ensures a steady flow of energy. On many rivers and their tributaries, barrage dams have been built to create artificial lakes or reservoirs. Some of these, like the Gouin Dam at the headwaters of the St. Maurice, are among the largest of their kind in the world. Many of the streams can be used for floating the logs to the mills. Where this is impossible railways have been built. The St. Lawrence River and canals provide a deep waterway into the country; the pulp and paper can be loaded directly on to the vessel from a number of mills. The Great Lakes and the St. Lawrence half encircle the southern edge of the great spruce-forest area to the north. There is a short haul, at most, to this great water route into the continent. And further, immediately to the south, lies a growing country whose demand for paper, and for pulp from which to make more paper, has grown with each decade. The United States provides an ever-expanding market for the Canadian manufacturer of pulp and paper.

In no other land are all the above favourable conditions found, and on so large a scale. Canada's pulp and paper industry is a study in geographic controls.

Over a million cords of pulpwood are exported annually to the United States. Many Canadians feel that this pulp should be manufactured at home, and it is now impossible to export pulpwood from Crown lands. The fact is that large pulp and paper mills have been erected in the United States near the Canadian border. These have used up the local supply of pulpwood, and they have naturally been anxious to secure a supply from Canada rather than close and abandon business. It is not an easy matter to move a pulp mill or the workmen and their homes. As the years go on, the weaker of these mills will probably close down, owing to keen competition and the increasing distance from the source of raw material. Pulpwood is bulky and will not stand the cost of transportation.

Some people think that the pulp and paper industry in the Shield has reached its maximum development—that the mills now operating are enough to keep pace with the possible reforestation by natural means, and that it would be better to farm the forest than exploit our reserves by over-expansion, and cut into the reserves of pulpwood faster than we can grow new forests. Reforestation is becoming more and more a pressing problem for the people of Ontario and Quebec. Government authorities have established tree nurseries and are undertaking and encouraging reforestation in various ways.

The clay belt of northern Ontario is a mixed farming region. The soil is fertile, but the long winters and late spring frosts restrict production to those grains, roots, and vegetables which mature quickly. Hay, oats, rye, turnips, and potatoes are grown successfully and make good feed for cattle, sheep, and pigs. Settlement in this area has been slow because of the severe winter and distance from urban markets.

Sault Ste. Marie is famous for its canal locks and iron smelters. Fort William and Port Arthur have immense grain elevators, through which the western wheat crop is transferred from trains to boats for shipment down the Great Lakes.

Mining.—Ontario is the principal mineral-producing province of Canada, accounting for over 50% of the Dominion total. The progress in this industry, is remarkable. The list of minerals includes twelve metallics,[1] three fuels, thirteen non-metallics, and six structural materials. Nearly all of these are products of the Shield.

Ninety per cent of the world's nickel comes from the Sudbury area, which is also rich in copper. The ore averages 2% to 4% nickel, and 1% to 3% copper. Gold, silver, palladium, and platinum are also present in these ores and add to the value of the product when recovered in the refining processes. Copper is second in the list of valuable metals recovered from the ores. The nickel mines of the Sudbury area are the chief sources of the Ontario supply.

These rich and truly vast deposits were discovered in 1883, when the Canadian Pacific Railway was blasting its right of way around Georgian Bay. The ores of the Sudbury basin form an ellipse 36 miles long and 13 miles broad. The 'matte' produced

[1]Nickel, gold, silver, copper, cobalt, platinum, palladium, iron, arsenic, bismuth, selenium, tellurium.



Courtesy National Film Board

TIMMINS

Compressed air power drills speed underground work. Timmins is the home of the famous Hollinger gold mines.

averages 50% nickel and 30% copper and is refined at Port Colborne and Copper Cliff respectively.

Ontario leads the other provinces of Canada in the production of gold, with a recovery of over 2,000,000 ounces per annum. The first permanent gold camp was established at Porcupine in 1912, and shortly afterwards the Kirkland Lake camp was opened. Other notable gold fields are Porcupine, Larder Lake, Matachewan, Michipicoten, Long Lac, Red Lake and Pickle Crow. It may be

interesting to compare Canada's production with that of other countries.

The gold ore of Ontario is ground to a fine powder which frees the gold particles from the enclosing rock. The powder is treated in a sodium cyanide solution which dissolves the gold. The useless rock dust is run off, and the solution containing the gold is treated with zinc dust, which precipitates the gold. The precipitates are then refined.

Recovery of metal is much more complicated than most people realize. Mining gold-bearing rock is a simple matter compared with the chemical treatment, which must be suited to the particular kind and type of ore. Canadian mining engineers have solved many difficult problems in developing our large mines. Refinement of the complex ores at Britannia Beach and at Sullivan Mine, British Columbia, are examples of years of hard work crowned with success. Today the chemical department is an integral part of every large mining establishment. There are mines in Ontario where the total cost of mining the ore and extracting the gold content has been brought down to less than $3.00 per ton of rock mined.

Silver is mined in the Cobalt, Gowganda, and South Lorraine areas, and recovery amounts to over 12,000,000 fine ounces per annum. The Cobalt deposit was discovered in 1903, during construction of the Timiskaming and Northern Ontario Railway from North Bay to the head of the lake. Peak production was reached in 1911, with a recovery that year of 31,507,791 fine ounces. Fifteen years after the founding of Cobalt camp, silver production had amounted to $169,292,351. Since that time the volume of silver production in Ontario has declined, and the discovery of rich cobalt ores in central Africa has seriously affected the production of cobalt, which is now relatively cheap.

Steep Rock, 135 miles west of Port Arthur, and the Helen Mine in the Michipicoten area are the most important iron ore producing centres. In 1947, the two mines produced about 2,000,000 tons of iron ore while in 1949, the output from Steep Rock alone rose to 1,300,000 tons with a value of $6,000,000. The ore in the Steep Rock Mine is obtained from open pits on the floor of a drained lake, 15 miles long and 150 feet deep.

In 1948, the total Canadian production of iron ore was about 3,000,000 tons, 1,000,000 tons short of the amount used in Canadian furnaces. In order to obtain a proper mixture, most of the ore used in the Canadian iron and steel industry is imported, largely

from the United States, while a large part of the Ontario ore is exported.

The centre of the iron and steel industry is Hamilton, where a recent great expansion programme has increased Canada's steel-making capacity, now approximately 4,000,000 tons of pig iron annually, by 20 per cent. Four giant blast furnaces, including two of the largest in the Dominion, are in use in Hamilton. Other important centres for the steel industry in Ontario are Sault Ste. Marie and Port Colborne.

Another outstanding mining development in recent years in eastern Canada has taken place in the Rouyn district, near the Ontario-Quebec border. Here copper and gold are widely distributed. In 1926 a branch line from the Canadian National Railway was extended into the Rouyn gold-copper camp. A smelter was completed for the Noranda mine, and production began in December, 1927. The copper is converted into blister-copper and then sent to the refinery in Montreal East.

A whole district has been opened up since the discovery at Rouyn. Mine after mine has gone into operation, and the production in this area now runs into millions of dollars annually. Where twenty years ago there was nothing but forest and muskeg, towns have sprung up, with schools, hospitals, and churches. Roads have been built, as well as two railways, one from the Kirkland Lake district to the west, and one from the trans-continental line to the north. Within twenty-five years the province of Quebec has developed one of the most important mining districts in North America.

Lead and zinc are also being produced in increasing quantities in two mines in western Quebec; one in Bourlemaque Township, and the other on Calumet Island in the Ottawa River. The concentrates from these mines are shipped to the United States and to Belgium.

At Kilmar, near the southern rim of the Laurentian Highlands in western Quebec, is an important magnesite mine. Magnesite is highly resistant to heat and is used in the manufacture of bricks for the lining of furnaces used in the manufacture of steel.

The most sensational mineral discovery in northern Quebec in recent times has been the enormous deposits of high grade iron ore and ilmenite in north-eastern Quebec. The ilmenite is located near Allard Lake 25 miles north of Havre St. Pierre. It is believed to be the largest single deposit in the world, and, as the source of titanium, is of very great importance, since the oxide of titanium makes the whitest of all white paints, and titanium itself shows

great promise as a structural metal, since it is light in weight, strong, and will not corrode. A railroad from Havre St. Pierre to Allard Lake has been built to bring out the ore, and at Sorel a smelter has been constructed to refine it.

The iron deposits are of immense extent, and should be of the greatest value to North America since the ores in the United States west of Lake Superior are being rapidly exhausted. The deposits lie on both sides of the Quebec-Labrador boundary, and extend north as far as Fort Chimo. A railway has been built from Seven Islands, on the Gulf of St. Lawrence, to Knob Lake and Burnt Creek, the present centres of development.

Some interesting mining facts.—The Kirkland Lake mine is down 7,200 feet, and is now the deepest mine in Canada. Gowganda and Red Lake are new gold-mining districts. Red Lake is 110 miles from Hudson on the main line of the Canadian National Railway.

The big smelter at Copper Cliff can handle 5,000 tons of ore daily. The concentrator plant is able to take care of 8,000 tons of mine ore each working day. The main stack of the smelter is 510 feet high and 45 feet inside diameter. At Coniston there is a 3,000-ton smelter. Pulverized coal is used in these smelters at the rate of 700 tons in 14 hours. The coal comes from West Virginia and Pennsylvania. There is a large nickel refinery at Port Colborne.

Nickel ore of the Sudbury basin contains small amounts of the platinum group of metals. These are refined at the Acton plant, near London, England, where the largest platinum refinery in the world is found.

At Blacksmith Rapids, on Abitibi River, a high-grade lignite bed—over a mile long by half a mile wide—was found and estimated to contain 100,000,000 tons of low grade coal.

Canada is one of the world's largest producers of radium, and also of uranium, the substance from which atomic power is derived. Both radium and uranium are obtained from an ore called pitchblende, which is found in large quantities on the shores of Great Bear Lake. The mines, which are at a place called Port Radium, are under the control of the Canadian Government. The ore, which is refined at Port Hope, in Ontario, has a long journey to the refinery. In summer, it moves by boat or barge across Great Bear Lake, down the Bear River, up the Mackenzie River, across Great Slave Lake, up the Slave River, across Lake Athabaska and up the Athabaska River to Waterways, where it begins its long journey by rail to Port Hope. A plant, where atomic energy is

developed, and where experiments in its use are carried on, is situated at Chalk River, not far from Ottawa.

A new open pit asbestos mine is being developed in the Shield near Matheson, Northern Ontario. This will be the first important mine of its type in the province.

Sudbury, west of Lake Nipissing, is the chief distributing and railway centre for the Sudbury basin. It is the nickel centre of the world. Nearby is the big smelter at Copper Cliff. Timmins is the business centre for the Porcupine goldfield, and the town of Kirkland Lake holds a similar position for the areas further east.

The fur trade.—The fur trade of Ontario is more valuable than that in any other province. Although more pelts are obtained in Alberta in some years, those from Ontario are more costly. The silver fox leads in value and comes entirely from fur farms located in all parts of the settled portions of the province. The muskrat is second in value and the mink third.

Fishing.—The chief fishing waters of Ontario are the Great Lakes. Other lakes of importance are Lake Nipissing, Lake Nipigon, and Lake of the Woods. The chief fish caught are whitefish, salmon trout, pickerel, and lake herring, and are valued at over $2,000,000. Ontario's lakes and streams provide an unusual opportunity for the ardent sportsman and are attracting each year thousands of tourists from the United States, but the importance of fresh-water commercial fishing is fast decreasing with the depletion of the fish population.

Hunting and sports in the Laurentian Shield.—Sportsmen from the United States, and from many parts of Canada, flock in increasing numbers to the northern woods in eastern Canada during the hunting and fishing season. Catering to the requirements of these sportsmen has become quite an industry, for most of them come expecting to be outfitted and provided with guides. During the winter, thousands of skiers from Montreal and other cities of the lowlands, travel to the resorts in the Laurentians. The beautiful woods and magnificent scenery around St. Sauveur, Ste. Agathe, and Shawbridge, north of Montreal, attract many others during the summer also, and providing food and shelter for these tourists has created another promising industry in the more popular places.

In Conclusion the Shield areas of northern Ontario and Quebec first became important for their mines, lumber camps and pulp mills. Later they attracted farmers to the clay belt. The northern

forest soils require long and careful management to become productive, and settlers have not been able to become established as readily as the pioneers in the southern parts of the province. Settlement of the clay belt for farmers has required assistance from Provincial governments but, under a wise land use policy which is evolving, the northern farms should be able to feed the industrial populations of the north as well as export certain products for which they are particularly suited, notably seed potatoes. Much of the area, however, will always be forest land and the governments and industrialists of both provinces are developing means of sustaining yields of pulp and lumber on lands best suited to them.

EXERCISES

1. What are the possibilities of development in northern Quebec? Why has development along the north shore of the St. Lawrence from the Saguenay eastward taken place so much more slowly than on the south shore east of Rivière du Loup?

2. Annually Canada imports thousands of tons of cryolite from Greenland and bauxite ore from British Guiana. Both ores are used in Quebec in the manufacture of something which your mother uses in her kitchen. What is it?

3. Canada leads the world in the production of nickel and asbestos. In what other countries are these minerals found?

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8

THE MARITIME PROVINCES AND THEIR ATLANTIC NEIGHBOURS: GREENLAND AND ICELAND

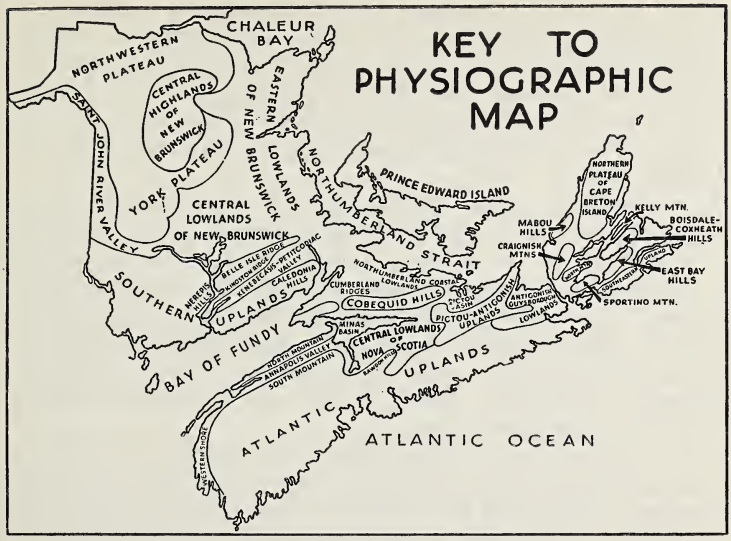
THE MARITIME PROVINCES IN GENERAL

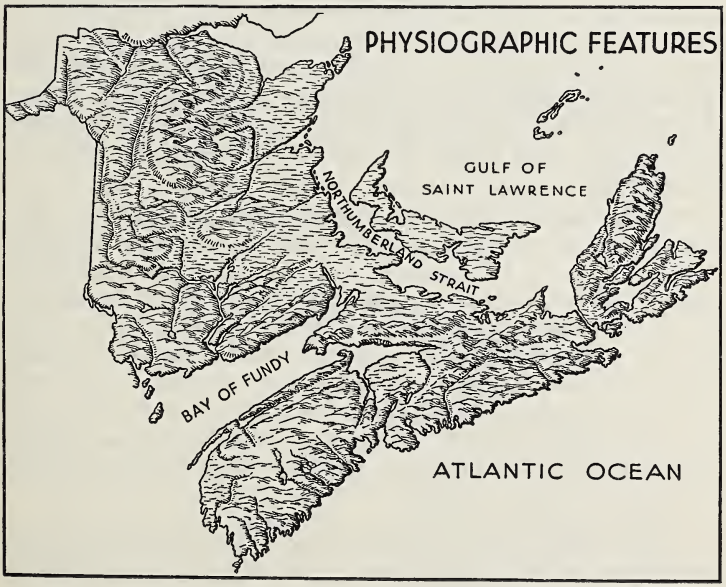
The first Europeans to visit the coast of eastern Canada told wonderful tales of the fish they had seen. John Cabot said that codfish were so plentiful that they impeded the sailing of his vessel. The tales spread from the fishermen of Bristol to the fishermen of Devon, across to Brittany, and even to the land of the Basques in northern Spain. And the tales grew with repetition.

The fishermen manned their little craft, and set sail across the Atlantic, fighting contrary winds, skirting icebergs, and creeping through the fog-blanket to find the 'baccalaos', the codfish seas of the new world. By the year 1500 many an adventurer had made the voyage, and had returned to his home port laden with well-cured fish. Others followed, and by the year 1578, it is known that some four hundred vessels frequented the Grand Banks each year.

This did not lead to settlement as one might expect. The fishermen came in the spring, and went home in the fall. In 1650, Newfoundland contained less than 350 families in fifteen scattered settlements along the south-eastern shore. It is doubtful if the shores of the adjacent mainland could boast a larger number. The market for the fish was in Europe, and the fishermen preferred to remain at home during the winter.

One other factor discouraged settlement in these new lands. A comparison of the January isotherms for Europe and for the eastern coast of North America will show that the climate of the coast from Labrador to Cape Cod is much colder than the same latitude in Europe. The prevailing wind is westerly, from the land to the sea. In winter, the land becomes cold, and winds from the interior of North America sweep out to the Atlantic bringing the cold with them. Lands so situated do not receive the full benefit of their nearness to the sea. On the European coast the


KEY TO PHYSIOGRAPHIC MAP
CHALEUR BAY
NORTHWESTERN PLATEAU
CENTRAL HIGHLANDS OF NEW BRUNSWICK
EASTERN LOWLANDS OF NEW BRUNSWICK
SAINT JOHN RIVER VALLEY
YORK PLATEAU
CENTRAL LOWLANDS OF NEW BRUNSWICK
NORTHUMBERLAND STRAIT
PRINCE EDWARD ISLAND
NORTHERN PLATEAU OF CAPE BRETON ISLAND
KELLY MTN.
BOISDALE-COXHEATH HILLS
MABOU HILLS
CRAIGNISH MTNS.
EAST BAY HILLS
SPORTINO MTN.
SOUTHERN UPLANDS
HERBERT HILLS
CALEDONIA HILLS
CUMBERLAND RIDGES
NORTHUMBERLAND COASTAL LOWLANDS
COBEQUID HILLS
PICTOU-ANTIGONISH UPLANDS
ANTIGONISH LOWLANDS
MINAS BASIN
CENTRAL LOWLANDS OF NOVA SCOTIA
SOUTH MOUNTAIN
ANNAPOLIS VALLEY
BAY OF FUNDY
ATLANTIC UPLANDS
ATLANTIC OCEAN


PHYSIOGRAPHIC FEATURES
GULF OF SAINT LAWRENCE
NORTHUMBERLAND STRAIT
BAY OF FUNDY
ATLANTIC OCEAN

reverse is true. The westerlies blow from the sea to the land, and we find mild temperatures as far north as latitude 60°. (Similar conditions prevail on the east and west shores of the North Pacific.) And so the immigrant would have to accustom himself to a colder climate than the one he proposed to leave. This, no doubt, prevented many from attempting settlement in the lands of eastern Canada.

Another disadvantage for the settler was the primeval forest which in many places covered the land down to the water's edge. Only with the greatest difficulty could the land be cleared in order to provide food for the fisherman and his family. There were also frequent wars between England and France, when coastal villages would be open to sudden enemy raids. As we know, similar conditions retarded growth of French settlement in the St. Lawrence lowlands, where to the rigours of winter were added the dangers of Indian ambush and attack.

The first settlements of importance were made by the French in Nova Scotia. They early discovered the meadow-lands of the Annapolis and Grand Pré valleys. A few fishing stations grew up between Canso and the Miramichi, and the great fortress of Louisbourg became the nucleus for settlement on the Cape Breton coast. After the building of Halifax (1749), and the fall of Louisbourg nine years later, the Acadian land became definitely and permanently English. The population increased, many settlers coming from the New England colonies, and after 1783 thousands of Loyalists found homes in Nova Scotia and in the valley of the St. John.

Physical features.—The Maritime Provinces, including Newfoundland, are the northern end of the Appalachian Highland. The highland has been heavily glaciated and shows partial subsidence, the ocean filling the glacial grooves, as in Newfoundland, and flooding the hollows between parallel mountain ridges as in the Bay of Fundy. Similar conditions occur along the coast of Maine, and as far south as the mouth of the Hudson River. The New Brunswick coast slopes gently to the Gulf of St. Lawrence, and Prince Edward Island is a garden of fertility, but the remaining shore-lines present a rocky, indented, bold, bare front to the pounding of Atlantic billows.

Fishing.—The shallow seas or 'banks' which lie off-shore, give an estimated 200,000 square miles of grounds suitable for fishing. The nature of the Atlantic coast fisheries offers opportunity for comparison with the fisheries of the North Sea and the Pacific

coast. After four hundred years of continuous fishing, cod is still the fish caught in the largest amount along the Atlantic coast of Canada. The cod begin to appear near the coast about the first of June, seeking shallower waters for spawning. The caplin, about seven inches in length, herald their approach. Vast schools of these small fish are seen near the coast, and in the shallow bays. The cod follow the caplin, feeding greedily. Within six weeks the caplin disappear, and their place is taken by squid. These in turn give way to herring, which continue till the end of October, when the cod fishing ceases.

From the ports of St. John's, Placentia, and Bonavista in Newfoundland, from Sydney, Canso, Lunenburg, and Liverpool in Nova Scotia, and from Gloucester and Boston in Massachusetts, schooners go forth to the banks. Piled high on either side is a nest of dories, four or five to the nest. Arrived at the fishing grounds the crew of from fifteen to twenty men lower the dories and row to their stations. In each dory is a tub containing a coiled trawl-line about 3,000 feet long. To the trawl, at intervals of six feet, are fastened strong lines two feet long with a baited hook at the end of each. Two men go in each dory.

As the dory is rowed the line is paid out with a weight attached to make it sink to the bottom, 50, 60, 100 fathoms down. A line attached to a float marks the place of each set. After the lines are set the men spend the rest of the day hauling up the trawl, passing it over the dory, and taking off the fish. The hooks are rebaited and the trawl goes down for more fish. It is cold, wet, hard work. Only men who are strong and healthy can stand the life. At length the schooner collects the dories, the fish are forked over the side, and the dory either hoisted on board or trailed behind.

Then the sailors set to and clean the fish, which are thrown into the hold and packed in salt. By the time all the dories have been collected it may be blowing a gale and as dark as pitch. The cook has supper ready, the men gather round the fo'c'sle, smoke a pipe, and roll into their bunks. The next day brings the same round of activity, and again their tired bodies need refreshing sleep. The schooners stay out for many days, perhaps a hundred miles from the nearest land and five hundred miles from their home port.

When the schooner returns to port, the cod are landed and spread out upon racks to dry. These are lath-covered frames about three feet high. The fish are turned from day to day, and in the cool sea-breeze and bright sunshine the cod loses one-third of its weight and the flesh becomes hard and firm. Properly dried and

cured, salt cod will keep for a long time, even in the hot climate of the tropics. The cod fish has been called 'the bread of the seas'. It is purchased in large quantities by the people of Spain and Italy, and because of its keeping qualities it is one of the chief articles of trade with the West Indies.

Inshore fisheries are carried on within twelve or fifteen miles of the coast and are much more convenient for the fishermen. Each day motor boats put out to the grounds. The men fish for several hours and return at once with their catch, which is shipped fresh in refrigerator cars to markets as far away as Toronto, Montreal, and Boston. Abundant harbours and nearness of the fishing grounds to shore make it possible for many fishermen to pursue the inshore fishery. It involves less hardship, requires less equipment, and may bring larger profits than the deep-sea fishery. Fish that are dried and cured soon after they are caught are of better quality than those which have lain for some time in the schooner's hold. However, the lure of the Grand Banks is strong, and some prefer the longer voyage and steady work at sea. The town of Lunenburg has a fleet of over a hundred schooners whose crews share in the deep-sea fishery.

Since the Second World War, the trawler fleet has been increased and another type of vessel, the dragger, has also made its appearance. The steamer tows a funnel-shaped net, which tears along the bottom, gathering every kind of fish in large numbers. By means of this otter trawl, the fishermen can take much larger hauls in a given time than by the older hand method. It is doubtful, however, whether the banks will stand too many years of steam trawling when so many undersized fish are caught.

It is difficult to estimate the total amount of cod caught on the banks in any one year, but it is known to have exceeded the 75,000-ton mark. Similar quantities are landed at New England and Newfoundland ports. We may well ask why it is that the codfish frequent these grounds in such large numbers.

The shallow platform at the end of the Appalachian highland provides depths varying from 100 to 600 feet. These grounds are continually being renewed and enlarged by the glaciers of Greenland, which thrust into the sea and break into the huge icebergs of the north Atlantic. These carry quantities of detritus, which is deposited when the iceberg grounds and melts at the edge of the bank. Food for the fish is provided by the North Atlantic Drift, which flows slowly northwards from the Caribbean, the Gulf of Mexico and the Equatorial parts of the Atlantic. It is thought that these warm waters carry with them minute marine

organisms and plants. Off the coast of Newfoundland the North Atlantic Drift is met by the cold waters of the Labrador current, which may likewise bring marine plant forms from the Arctic. In addition to these we find the Gulf of St. Lawrence receiving the outflow of streams and lakes which drain a basin of 500,000 square miles.

In this great larder of the sea, small crustaceans the size of a pea feed on the minute plants and marine organisms. The herring, caplin, and squid feed on the crustaceans, and these in turn are devoured by the cod. Man completes the cycle when he catches the cod and turns it into human food. The glaciated and partly submerged coastline provides hundreds of natural harbours and bays where the fisherman may set his nets for the herring and squid, and where he may land and dry his catch. It is probable that cod are not as plentiful as in the days of John Cabot, but they are still there in their millions. When we think of the steady harvest during the last four hundred years, we are led to wonder which people have gained the greater reward, those who sought the New World for gold or those who came to till the sea.

The Atlantic fisheries provide a large variety of edible fish, and are not so dependent upon one or two species as is the case in British Columbia waters. Reference has already been made to the herring which is caught in large quantities inshore. Thousands of tons of these fish are used for bait in catching cod, halibut and lobsters. Halibut are not as plentiful as on the Pacific coast. Haddock are split, smoked, and sold to the trade as finnan haddie. Mackerel are also caught along the Nova Scotia and New Brunswick shores.

It would seem as though nature had stocked these waters with a lavish hand. Around the five thousand miles of coastline, from Maine to Gaspé,[1] there is also found a large, dark-green crustacean, the lobster. This rather ugly-looking individual crawls over the rocky bottom near the shore, seeking whatever may come within the grasp of his powerful claws. This fishery, if such it may be called, is under strict Government regulation and is rapidly increasing in value. The lobster is caught in wooden pots, so constructed that he may crawl in but cannot get out. A bag of bait, the usual herring, is the lure inside the pot. Some of the lobsters are taken to small canneries located nearby, where they are boiled, and turn a bright red in the process. The shells are

[1]The following fish are also caught in Canadian waters: pickerel, trout, smelt, mackerel, perch, hake, pike, eels, pilchards, sturgeon, swordfish, goldeye, pollock, clams, oysters, and scallops.

cracked open and the sweet meat within is canned. Many lobsters are also shipped inland fresh. These are the greatest lobster grounds in the world. The 375 canneries along the Atlantic coast of Canada give work to some 6,000 people, and 30,000,000 lobsters is a normal yearly catch.

The Canadian fish trade is now so large that 70% of the annual catch is exported. The most important single export is canned salmon, which is sold chiefly to the United Kingdom and European countries. The salmon are followed closely by cod, dry-salted, to the West Indies and South America. The United States takes a large share of the fresh whitefish and lobsters.

NOVA SCOTIA

This weather-worn, rock-ribbed peninsula is 375 miles long and from 60 to 100 miles wide. No part is higher than 2,000 feet and no part is far from the sea. Rounded masses of rock rise boldly from the sea, with frequent breaks or indentations flooded by the water, and giving splendid harbours at numerous points along the entire coast. Nearly every bay or cove is occupied by a fishing village. There are 168 small canneries and fish-curing plants dotted around the Nova Scotia shore line. While the men are fishing, the rest of the family tend the small fields and gardens which stretch back from the village and up the valley of some small stream, which flows down from the height of the land. The climate is continental, although modified by nearness to the ocean. There are winter storms with sleet and snow; there are January

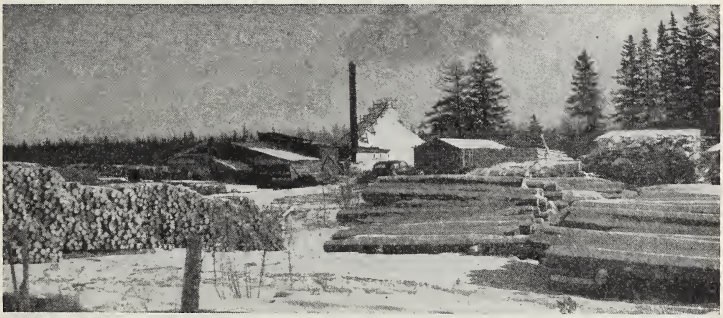


Courtesy C.N.R.

THE WATERFRONT AT LUNENBURG, NOVA SCOTIA.

thaws and warm east winds from the Atlantic; the spring is late and the summers are cool and showery. Along the south shore of the province most of the agricultural products are consumed either on the home farm or in the local market provided by the fishing and lumbering industries. The gradual change, which is now taking place, from cured fish to the fresh fish trade, and expansion in the pulp and paper industry are bringing about a measure of prosperity to those who live near the sea.

Forest wealth.—The whole of Nova Scotia was once forested. Today about 80% of the total land area of 13,275,520 acres remains in forest. The Maritimes are a mixed forest region, with spruce providing one-half of the soft wood stand, followed by hemlock, balsam, and white pine. Of the hard woods, beech, maple, and yellow birch are the most abundant. There are sixty



Courtesy Bureau of Information, N.S.

SAWMILL NEAR ELMSDALE, NOVA SCOTIA.

fair-sized saw-mills in the province. The total lumber cut in a recent year amounted to 387,996,000 board feet. The large paper mill at Liverpool has an output of 325 tons of newsprint per diem which is exported largely to New York and Australia. A pulp mill at Hantsport exports its product to Philadelphia. The following list gives an idea of the varied wood-working plants in Nova Scotia, and shows how they are based on a mixed forest region: wooden sailing vessels and boat-building plants, barrels and cooperage, hardwood flooring, sashes and doors, boxes, shooks, crates, ladders, wagons, carriages, sleighs, blocks and pulleys, lobster traps, skis, clothes-pins, shoe lasts, shoe peg-wood and excelsior, furniture and cabinet work.

The Annapolis valley is the garden of Nova Scotia. It lies between the rocky backbone of the peninsula and a low ridge



Courtesy Bureau of Information, N.S.

HAYING SCENE AT GLENDALE, CAPE BRETON.
Note the forested hills in the background.

which runs parallel with the Bay of Fundy. This depression is partly flooded by the Annapolis and Minas basins. Two sluggish and tidal streams flow basinwards from their water-parting near Berwick. Around their mouths the salt marsh has been dyked, many acres of valuable hay land having been reclaimed. The Maritime Marshland Rehabilitation Act of 1948 provides for an extensive programme of dykeland reconstruction. The Annapolis and Cornwallis valleys have a length of about seventy miles, and a width of from ten to fifteen miles. This is the noted fruit district of Nova Scotia, where 35,000 acres are under orchard. The North Mountain protects the valley from the north-west winds, and prevents spring frosts. The summer temperature is much higher than is that of the adjacent sea-coast for the same reason. Nearly 3,000,000 barrels of apples were grown on these fertile valley lands in a good year, and as many as 2,000,000 barrels have been exported.

During and after the second World War, Great Britain was unable to spare funds to buy Canadian apples, as other foods were more essential. This was a severe blow to farmers in the Annapolis Valley. The federal and provincial governments came to the aid of the farmers with advice and assistance. Many apple trees were uprooted and replaced by other crops. Local plants produced canned and evaporated apples and apple juice. As a temporary measure the price of apples was maintained by Government subsidies.

Land suitable for mixed farming and dairying has been developed chiefly along the north shore of Nova Scotia and in the lower

reaches of the Annapolis-Cornwallis valley. There are fertile areas in North Queens and Lunenburg counties on the south shore, in the Musquodoboit valley, and in the Sherbrooke and adjoining river valleys of Guysborough county. Summer rains and cool weather make hay, roots, oats, and potatoes the chief crops. Although the farmers of Nova Scotia have the use of fertile soils, a moderate climate and ice-free ports along the Fundy and southern shores, large imports of meat, cheese, flour, and other foods show that, in some particulars, there is plenty of room for expansion in agriculture, especially in the branch of animal husbandry. However, the ability of the St. Lawrence valley farmers to buy cheap feed grains from the prairies permits them to export Canadian bacon to England, and as much as 3,000,000 lbs. of beef and 900,000 lbs. of pork in a single year to the province of Nova Scotia and a similar amount to New Brunswick. This invasion of a local market by an adjoining area more favourably situated holds in check the live-stock industry and, to some extent, the agriculture of the Maritimes. It may also be noted that a high United States tariff limits the natural market — manufacturing New England — to the entry of Maritime-grown potatoes, berries, and small fruits.

Mineral Production.—Some of the metals and minerals found in Nova Scotia are coal, gypsum, gold, manganese, tungsten, lead, zinc, copper and salt. From this great variety of minerals, 80% of the total output of the mines is contributed by coal alone.

The extensive coal deposits cover an area of about 700 square miles in the counties of Cumberland, Pictou, Inverness, and Cape Breton. The most important coal-fields are at Sydney in Cape Breton where the mines extend along the coast and under the sea. These are the only coal-fields so situated along the eastern coast of the continent.

Only one other province, Alberta, exceeds Nova Scotia in the amount of coal mined and in the value of the product. The coal is of hard bituminous grade, and makes fine coke. Much more coal could be mined from these fields if the coal companies could find a larger market for their product. Export to the lower St. Lawrence accounts for a large percentage of the quantity mined and is a veritable safety-valve to the coal industry in reducing overhead costs. However, cargo vessels from Europe sometimes bring coal for ballast, so that the lower St. Lawrence market is not as completely under the control of the nearest coal mines as one would expect. Export of coal to South America or to the Mediterranean

depends upon a return cargo, which the Maritime Provinces cannot at present utilize. Fuel oil and hydro-electric power are serious competitors, as on the Pacific coast of British Columbia.

Closely associated with coal mining are the iron and steel industries of Sydney and Trenton where the iron ore and limestone are largely obtained from Newfoundland and the coal from the nearby coal-fields. Products obtained from these industries include steel railway cars, locomotive engine and passenger car axles, forgings for warships and cargo ships, and gun mountings.

Gypsum is mined near Windsor, and at Malagash are salt-mines where production has been continuous since 1916. Gold is recovered from a number of small veins in the gold-bearing rock which extends in a narrow band from Guysborough county to Queens county. The gold-bearing series goes inland to the east of Halifax, skips the shore for one hundred miles, and reappears again at the shore in Lunenburg county.

Cities.—Halifax (85,589) is the capital and the largest city of Nova Scotia and has long been one of the Commonwealth's naval bases for the Atlantic fleet. The city is at the head of a deep inlet which extends for 13 miles inland and affords a fine, natural, harbour. The harbour is large, land-locked, and ice-free, and during the winter season accommodates many of the liners which use the St. Lawrence during the summer. A large dry dock, ship repair plants, boiler and engine works, grain elevators, railway terminals, warehouses and wharves all speak of the busy seaport.

Halifax is the chief distributing centre in Nova Scotia for goods arriving by both sea and rail. Rail lines radiate through the interior of the province, distributing goods to lumbermen, fishermen, and farmers.

There are more than sixty industries in and around Halifax, the most important being ship-building, the manufacturing of food and candy, and the processing of fish. Halifax is also an important educational centre.

At Dartmouth, across the harbour, there is a large oil refinery which serves the needs of the four Maritime provinces. One of the chief products manufactured in Dartmouth is rope.

Sydney (31,317), on Cape Breton Island, is the second city of Nova Scotia and is situated in the centre of an industrial and mining region. The steelworks of Sydney are amongst the most productive in Canada. Huge stockpiles of ore and limestone are kept by the plant together with coal which is supplied from the nearby coal-fields.

The harbour is large and is open for most of the year. It is well equipped with modern mechanical devices for loading and unloading. The traffic through the harbour consists, for the most part, of coal, for delivery to the St. Lawrence River ports, and incoming iron ore and limestone for the steelworks.

Truro (10,756), is a great distributing and servicing centre. Several light industries are located here, ranking Truro third among the manufacturing centres of Nova Scotia. An important group of towns is found in the Pictou mining and industrial area. These include **New Glasgow,** a general manufacturing and commercial centre; **Trenton,** with steel works; and **Pictou,** county town, seaport and shipbuilding centre.

NEW BRUNSWICK

New Brunswick resembles Nova Scotia in its surface features, but has much less seacoast population in proportion to its land area. The ancient ridges of the Appalachians run out to the end of the Gaspé peninsula, and form a water-parting between the St. Lawrence valley and the valleys of New Brunswick, which slope to east and south. The Notre Dame mountains also form a barrier to trade between the two provinces. There are two gaps through these mountains to the St. Lawrence valley. As in Nova Scotia, the trade routes of New Brunswick point southward to New England and the West Indies, and eastward to Prince Edward Island, Newfoundland, and Great Britain. The climate of New Brunswick is more continental than that of Nova Scotia. The winters are colder and the summers warmer, and more of the precipitation falls as snow. Trade with Nova Scotia is largely a matter of imports of coal, iron, and fruit.

Forest wealth.—About 80% of New Brunswick's 27,911 square miles is in forest. The Restigouche valley is still a hunter's and angler's paradise, where wealthy men rent river frontages from the Government, erect their summer homes, and whip the streams for the fighting salmon. In the fall, hunting attracts many more to the deeper forests of the central part of the province. South of the Restigouche, the land rises to a block of hills of 2,000 feet elevation, and these still further hinder commerce and settlement in the northern part of the province. The Miramichi is the principal stream of eastern New Brunswick. Its valley is broad, low, and gently rolling. Lumbering is the chief occupation of the people who have settled along or near the C.N.R. line which runs from Moncton to the St. Lawrence valley, and it is said that one cannot

go far beyond the sound of a saw-mill. There are lumber mills and pulp mills at Edmundston, Dalhousie, Campbellton, Bathurst, Newcastle, Chatham, and Richibucto.

The snowfall is heavier in New Brunswick than in the sister provinces by the sea, and the 250 lumber mills are easily supplied with logs hauled over snow roadways in the winter time, and floated down the rivers during the spring freshets. In the manufacture of pulp and lumber New Brunswick leads the other Maritime provinces by a good margin and stands fifth in the Dominion.



Courtesy, C.N.R.

Loading pulp wood at Morrison's Cove, Chatham, New Brunswick.

The fisheries of the province differ from those of Nova Scotia in several particulars. Owing to the greater distance from the banks, New Brunswick fishermen devote their energies to inshore fisheries, and there is a moderate catch of cod, haddock, halibut, and hake. Some mackerel, shad, and salmon are also secured. Large catches are made of herring, smelt, and lobsters. Lobsters are caught along the whole New Brunswick coastline. They are packed in ice, and shipped to the New England states. Those caught along the Gulf of St. Lawrence coast are canned. Young herring are caught during the summer in brushwood weirs erected in tidal coves sheltered from the waves. The small-sized herring

are used as sardines, and many thousand cases are canned each year. This industry is located on Passamaquoddy Bay.

The Moncton district includes the valley of the Petitcodiac, which drains into the head of the Bay of Fundy. This is an area of fertile dyke lands, and dairying is of prime importance. Sackville is the business centre of the large Tantramar marsh agricultural district. It is also noted for the making of stoves, ranges, and furnaces, and as the home of Mount Allison University. There is oil nearby.

West of Moncton, a broad valley extends to the St. John River. It is bounded on the south by a ridge of rock which shuts off the Bay of Fundy as in Nova Scotia. Hay, grain, roots, vegetables and apples are grown. There is dairying and mixed farming, with a market in the industrial centres to east and west.

Moncton (27,334) is the large business centre and manufacturing city of eastern New Brunswick. It is conveniently situated with respect to the main rail line from Halifax to Quebec, and with a branch line running west to Saint John. A second line runs west to Fredericton, and another runs to the gulf shore and the ferry to Prince Edward Island. Moncton is a distributing centre for a large area. Up the narrowing Petitcodiac River the tide rushes in, reaching Moncton in the form of a bore several feet high. Natural gas is piped into the city from a field near at hand and supplies a cheap form of power. There are railway shops, foundries, machine shops, a wire-fencing plant, woollen and cotton mills, and a carriage factory. Hats and caps, mattresses, and biscuits are also made. Grist mills and woodworking plants supply the local demand.

Western New Brunswick is drained by the St. John River, the largest river of the Appalachian highland north of the Hudson. The St. John is 450 miles long and drains an area of 26,000 square miles. Throughout this area lumbering is one of the principal industries. Lumber mills are located at Edmundston, Grand Falls, Bath, Woodstock, Fredericton, and the city of Saint John.

The Grand Lake area produces about half a million tons of coal a year.

Mixed farming and dairying are carried on in the fertile lowlands of the St. John valley, and within reach of the railways. The climate is ideal for the production of oats, barley, hay, roots, and vegetables of the highest quality. New Brunswick turnips, potatoes, and garden vegetables have a fine reputation. The western portion

of New Brunswick, like that part of the State of Maine just across the international border, specializes in growing potatoes. Cool summers with good rainfall and a soil of sandy loam make potatoes the most profitable crop and carloads are shipped to the interior of Canada as well as to the United States. They are also in demand for seed in places as far apart as Ontario, Rhode Island, New Jersey and Virginia. The annual value of this crop is now over $9,000,000.

Hay is grown to the amount of over 700,000 tons annually. The rivers have fertile meadow lands, and there are long dyke lands at the head of the Bay of Fundy. Some of the hay is baled for export. Dairying is capable of great expansion as the province contains 10,700,000 acres of arable land, and less than half of this is occupied.

Fredericton (16,000), the capital, is located on the St. John River, near the head of navigation. The Parliament Buildings, the University of New Brunswick, and the Provincial Normal School make the city a centre of education and of culture. Some manufacturing is carried on in making canoes, motor boats, shoes and leather, and lumber. Fredericton controls the trade of the middle section of the St. John. It is in a protected position, with a healthful climate and a superb location on the bank of the wide river winding slowly past. From a commercial standpoint, however, it cannot compare with either Saint John or Moncton.

Saint John City (50,779), situated at the mouth of the river, is the largest city and principal seaport of New Brunswick. It is ice-free during the winter, and is one of Canada's national winter ports on the Atlantic coast. The lumber mills, woodworking factories, and sash and door and box factories remind one of Vancouver on the Pacific coast. There are also a sugar refinery, fish product plants, tanneries, flour mills, and factories which manufacture biscuits, confectionery, paper bags, brooms, brushes, and nails. Saint John is the financial metropolis of the province.

The harbour is accessible to ocean vessels of large tonnage, and a breakwater, 7,070 feet in length, has been constructed to enlarge the natural port facilities. The new dry dock, 1,150 feet long, compares favourably with the one at Esquimalt. The tides of the Bay of Fundy cause an average rise and fall of twenty-five feet in the harbour, and this factor has hindered development of the port to some extent. However, it is but 483 miles from Montreal by rail, which gives Saint John an advantage over Halifax, 276 miles distant on the Atlantic coast of Nova Scotia. The three grain

elevators have a combined capacity of 2,250,000 bushels, which seems adequate for the present flow of grain. The shorter rail haul from Montreal to Portland, Maine, and the still better route from Buffalo to New York, provide serious competition with the export of Canadian wheat through Saint John or Halifax during the winter months.

St. Stephen and **St. Andrews** are large towns in the St. Croix River basin. Fishing in the bay, and lumbering in the hills, are widespread industries. Manufacturers of confectionery, fertilizer, carriages, and edge tools are worthy of note.

Summary.

New Brunswick's future lies in the gradual clearing of the forest cover from the land suitable for farming and the development of a dairying industry comparable to that of the St. Lawrence valley. This is true in a lesser degree of Nova Scotia. Both provinces are lands which have been 'passed by'. The flow of trade into the St. Lawrence passes towards the north, the commerce of New England and of New York towards the south. The opening of the west, with its freedom from forest, and its easily ploughed soil, has lured away thousands of the sons and daughters of the less favoured Martimes. But much of the best land in the west is now occupied, and the indications are that there will be a more rapid development of these provinces by the sea.

In all of the Maritime Provinces, co-operatives of many types are helping to meet the problems of both producers and consumers, cut off from easy trade with the rest of Canada. Fishing co-operatives have brought new hope to fishermen by helping them to market their catch. Other co-operatives help to keep down the cost of necessary purchases by buying in large quantities. There are co-operative banks, and, more recently, co-operative medical services. Still other co-operatives carry on manufacturing in small plants.

One outstanding change has taken place recently in New Brunswick. French-speaking Canadians from the St. Lawrence Valley have been entering the province from the north so that now French-speaking citizens form over 35 percent of the population.

PRINCE EDWARD ISLAND

The area of the smallest province of the Dominion is 2,184 square miles, but nearly every square mile of it is arable land. Of the 1,397,760 acres in Prince Edward Island, 1,216,483 acres

are under cultivation. There are no mountains, and the general contour is under 400 feet in elevation. The red, sandy clay loam is easily cultivated, and the province has been called the 'Garden of the Gulf'. One admirer has said that 'in proportion to its area this is one of the finest pieces of agricultural land east of the Alleghany Mountains'.

The climate is cool and damp, oats and hay are extensively grown. However, this is a climate and soil which the potato likes, and the farmers of Prince Edward Island have concentrated on potatoes. About 3,000,000 bushels are exported annually under strict grading conditions. They are sold as far south as Florida to the market gardeners who must have northern-grown potatoes for seed. This is an example of nature's imposition of certain limits of plant cultivation, and shows how people in one climatic area may help people living in another area. Carolina and Florida gardeners plant potatoes in the winter season, and produce early potatoes in the spring for the great Philadelphia and New York markets. But those gardeners cannot produce seed to grow again. The potato plant loses its productive power when grown in that mild climate, and becomes subject to disease. Hence the yearly demand for hardy seed grown in the north. When we add to this an absolute honesty and integrity in grading the seed, the excellence and reliability of the product secures the market.

Dairying is growing in importance, with hay, oats, turnips, and forage beets grown on a large scale. From an agriculatural standpoint Prince Edward Island is in a prosperous condition. There are twenty-four butter and cheese factories. The total from agriculture amounts to $16,7000,000, which is a fair amount for a population of 98,000.

The fisheries are also important, particularly those of lobsters and oysters. The most productive oyster beds are found in Richmond Bay.

In view of what has been said, one would hardly expect to read the following:

Population in	1891,	109,078
"	1901,	103,259
"	1911,	93,728
"	1921,	88,615
"	1931,	88,038
"	1941,	95,047
"	1949,	94,000
"	1951,	98,429

The gradual decline in population is due to two factors. The opening of free lands on the prairies at the end of the nineteenth

century began to draw thousands of the youth from the farms of the island. Today, they and their descendants are to be found in every town of any importance from Winnipeg to Victoria. There has been a steady drain to the New England states, where the manufacturing centres call for strong arms and steady performance. The provinces of Nova Scotia and New Brunswick have also felt these 'pulls', and their slow growth in population during the last thirty years, as shown in the table below, is attributable in no small measure to the migration of their youth to New England and the Canadian West.

	New Brunswick	Nova Scotia
1891	321,263	450,396
1901	331,120	459,574
1911	351,889	492,338
1921	387,876	523,837
1931	408,219	512,816
1941	457,401	577,962
1949	516,000	645,000

According to the 1941 and 1949 figures, however, this trend seems to be reversed and the Maritime Provinces are once more coming into their own.

Fox farming.—Despite the depleted population, it cannot be said that those who remained in Prince Edward Island were discouraged. In 1910 the price of silver fox peltries ran anywhere from one to two thousand dollars for prime skins. It was found that the fox could be bred in captivity, and that the climate of the island was suitable. In 1915 the Silver Fox Breeders' Association of Prince Edward Island was formed, and within four years the proceeds from the sale of furs and of animals for breeding amounted to over a million dollars. With increase in production has come a decline in price, and prime skins now sell for $28. Style now seems to favour the short-haired furs and mink is replacing fox on many fur farms in Canada. Scientific breeding has produced what is known as mutation mink in various colours such as blond, pure white, and silver blue.

Charlottetown (15,689), is the one large urban centre on the island and accounts for nearly half the manufacturing products of the Province. Its industry consists mainly of processing agricultural products and the making of small articles. It is one of the important distributing centres of the Maritimes and is the centre of the Island's tourist trade.

Summerside is a fishing centre, particularly for the oyster fisheries. It is also a trading and shipping centre, and the location of the Dominion Experimental Fur Farm.

There are no forest industries, no minerals, and only small industries such as canning and the manufacture of starch, evaporated milk and butter and cheese exist within the confines of the little island. The wealth of the province lies in its farms and in the self-reliant qualities of the people. In recent years the tourist industry of Prince Edward Island has been greatly developed.

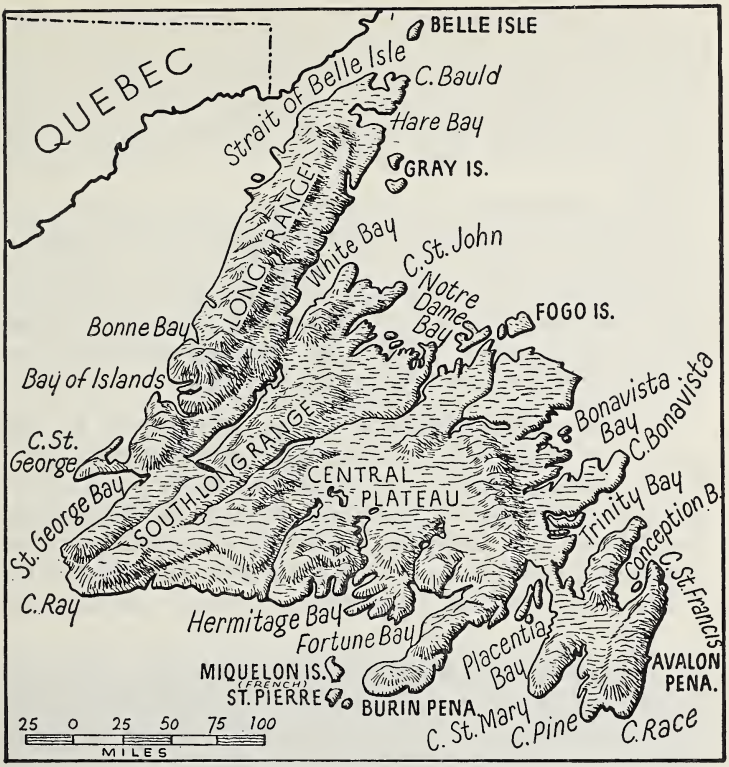
NEWFOUNDLAND

In 1650, Newfoundiand contained but 350 families, or fewer than 2,000 people, scattered in fifteen small settlements along the eastern shore. The Treaty of Utrecht, 1713, gave Newfoundland to England, but still permitted the French certain fishing rights along the western, or Gulf, shore of the island. The population increased slowly to about 8,000 in 1763, when the Treaty of Paris closed the struggle between the French and English for dominance in North America. By 1815, and the close of the Napoleonic wars, the population numbered 80,000. In 1949, it had increased to 348,000, and in the same year, Newfoundland joined the Dominion of Canada. Thus Britain's oldest colony took its place as the youngest province in confederation.

It will be well for Canadians to study carefully the economy of this our most easterly outpost of Canada. The second World War proved the value of this island for the security of North America. Well has it been named 'The Gibraltar of North America', and Canadians may think of it as 'The Watch Dog of the St. Lawrence'.

Physical features and climate.—Newfoundland has an area of 42,734 square miles. It is almost divided by a number of bays and fjords which cut deeply into its coastline. For this reason, many early maps represented the country as a collection of islands. One is struck, when approaching the coast, by its bare and forbidding appearance and by its high and rocky cliffs. Behind this austere coastline is a plateau cut by rivers, in whose valleys are areas of arable land.

The mountain ridges, about 2,000 feet in height, run to the north-east in parallel lines and may be considered as an outlying portion of the Appalachians. The effect of glaciation is shown in the number of lakes and ponds. Practically a third of the area of the island is covered by water, and it is possible on a clear day



Physiographic Diagram of Newfoundland.

to see as many as sixty ponds or lakes from a single hill. The climate is oceanic, the temperature in winter seldom drops to zero, except in the north-east and north-west, and the summers are cool. Fogs haunt the eastern and southern coasts but do not extend far inland.

Lumbering.—A heavy spruce forest covers the larger part of the interior of the island, and has been found valuable for pulp and paper.

At Grand Falls and at Corner Brook large pulp and paper mills have been erected. At the latter site is the world's largest newsprint manufacturing machine in operation, and Corner Brook also boasts the world's largest integrated pulp and paper mill. In this thriving town of 10,000 people, the annual production of paper

runs about 400,000 tons. About two-thirds of the paper is shipped to the United States and the remainder to the United Kingdom. In total value of export, paper and forest products now slightly exceed those of the fisheries. However, as only one-third as many people are given employment in the lumbering and forest industries, the fisheries still are of major importance in the economy of the province.

Newfoundland has much undeveloped water power which should bring wealth to the province as industries are developed.

In the central part of the island there are tracts of wilderness as yet little known. There one may still find cariboo, bears, wolves, beaver, and foxes. Forest fires and too much hunting have caused the fur trade to decline in value, but the numerous streams and lakes still provide sport for the ardent fisherman.

Agriculture.—Settlement received little encouragement for centuries, and the fisher folk were slow in attempting to make use of the soil. Fishing has been the adventurous livelihood of the inhabitants for so many years that the quiet life of the farm has had small appeal. But another reason for the slow development of agriculture in Newfoundland lies in the nature of the soil and the climate. Near the coast, the large rock masses are bare and



Courtesy C.N.R.

Bowater's Pulp and Paper Mills, Corner Brook, Newfoundland.

treeless. There is little soil, and what there is lies in pockets which the retreating glacier sprinkled copiously with stones and boulders. The cool, damp climate permits the growth of hay, oats, potatoes, turnips, and garden vegetables. Oats are the only grain which will ripen. Blueberries are gathered and frozen for export to the United States.

Fishing.—The many small villages of Newfoundland testify to the very vital part which the fishing industry plays in the life of the people. The lack of large cities and towns is a natural result of the way in which the fishing industry is carried on. The fisherman catches his fish, does his own curing, and often disposes of his catch in some foreign port. St. John's is the one large city, with a population of 45,000. It has a large, safe, landlocked harbour on the south-east coast, and is well situated for the export-import trade. It is the capital and the chief commercial centre.

The cod fishery gives employment to many people. It has been surrounded by a halo of romance from the days of Cabot to the present time. Few people realize the uncertainties of this industry, which is carried on amidst the dangers of the sea. There are perilous voyages across the ocean in small sailing-craft to dispose of the catch, and a great uncertainty regarding the consuming markets of the various purchasing countries. However, standardization of the methods of curing the cod, and the development of co-operative marketing, have given more satisfactory results to the individual fisherman.

The annual catch of cod amounts to 1,500,000 quintals.[1] A valuable by-product is cod-liver oil. Part of the oil is refined for medicinal purposes, and is considered to be of a particularly high grade. The total quantity amounts to some 500,000 gallons annually.

Salmon, halibut, caplin, lobsters, and herring are also caught. The lobster industry has grown rapidly in recent years, and there are now a number of canneries around the western and southern shore line.

Sealing is one of the more spectacular industries. It is carried on principally from St. John's. The harp-seals come south in the early spring to rear their young upon the ice floes off the coast of Labrador and Greenland. Early in March the steam sealing vessels set out from St. John's. It is a gala occasion, and the whole town turns out to wish the men *bon voyage*. The vessels carry crews of about 200 men. Their work is hazardous in the extreme, but

[1]**Quintal** = 112 lbs.

sometimes large profits are made. A good catch means that a vessel should bring back 40,000 skins and many barrels of oil.

The men land upon the ice floes, kill the bachelor seals with blows from a stout gaff, and drag the carcass to the water's edge where small boats gather the hides, to which a thick layer of fat adheres. The skins are taken to the parent ship, where the fat is removed and run into casks. Seal oil is a substitue for cod-liver oil, and is also used in the making of soap. The hide is made into leather, for hand-bags and motor-cycle seats.

Sometimes a storm comes on suddenly while the men are scattered on the floes. The floes break up and drift away in the gathering darkness, and, unless they are rescued in time, the unfortunate men are either drowned or frozen to death.

The once inactive whaling industry has been given a fresh impetus in the last few years. In 1948, a record catch of 750 whales yielded about 5,000 tons of oil. Harpoon guns are used, and the whales are towed by steam whalers to the north-east coast, where a number of small factories transform the blubber into oil, extract the whalebone from the mouth of the whale, and make a form of fertilizer from the flesh and offal.

Mining.—Thousands of tons of iron ore are mined annually from Bell Isand in Conception Bay. Two loading piers, each capable of accommodating the largest freight vessels, have been built, and loading devices which can handle up to 2,500 tons an hour have been installed on each pier. The mines are located two miles from the piers, and the ore is transported over cable tramways to the ore docks. The ore is of excellent quality, and the tonnage exported is increasing.

A coal-field, twenty square miles in extent, is know to exist in the area of St. Georges Bay. However, recent government reports have indicated that the formation is faulted and that it would be uneconomical to develop the field at the present time.

The Buchan's mine has been brought into production since 1928. The ores consist of lead, zinc, and copper with small values in gold and silver. There are 3,000,000 tons of available ore with a potential value of $200,000,000. It is probable that other ore bodies will be found as prospecting is carried on.

Labrador is the mainland section of Newfoundland and occupies the most easterly part of Ungava peninsula. The boundary between Labrador and the province of Quebec was settled by the Judicial Committee of the Privy Council in March of 1927, and now follows the watershed of the rivers flowing into the Atlantic

Ocean. The line runs from Blanc Sablon to Cape Chidley, giving Labrador an area of 110,000 square miles.

The population numbers 7,890, and Labrador is still one of the world's vast vacant spaces. The people are strung along the coast in a number of small fishing villages. Fishing is the main and almost the only means of subsistence. Supplies of food and clothing are brought in during the summer months from Newfoundland and the rest of Canada by trading vessels. Cured fish, chiefly salt cod, is sold to the trader who departs in the fall, and for the next seven or eight months, the villagers must fend for themselves.

The valley of the Hamilton River is said to contain millions of cords of spruce pulpwood, and some day a great paper-making plant may be built in that district. Recent surveys of Grand Falls on the Hamilton River show an estimated 1,250,000 horse power of hydro-electric power available. Several deposits of iron ore have been discovered in the same area.

Newfoundland, Labrador, Iceland and Greenland came into prominence during the second World War, as they lie on what is called 'The Great Circle Route', to Britain and Europe. Meteorological stations were established to send out weather reports and great air ports were established in Newfoundland, Labrador, and Iceland. These ports are still busy handling commercial air traffic. What is known as the Northern Route runs from Dorval airport, near Montreal, to Goose Bay in Labrador, across Greenland to Iceland and thence to Prestwick in Scotland. The 'Southern Route' goes from Dorval to Gander Lake in Newfoundland, from there to Shannon airport in Ireland, and so to Prestwick.

Newfoundland is also the western terminus of the undersea cables from Britain and Europe. The care and repair of these cables is a service of utmost importance.

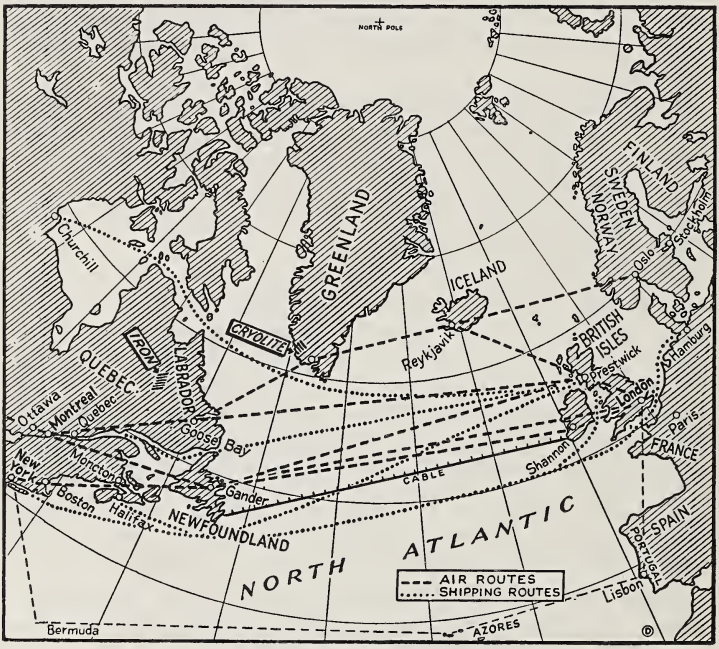
GREENLAND

Greenland, a Danish colony, is an island continent bounded on the east by the North Atlantic and the Norwegian and Greenland seas and divided from Iceland by the Denmark Strait. On the west, Baffin Bay and Davis Strait separate Greenland from Baffin Island. The major part of the island lies within the Arctic circle and of a total area of 830,000 square miles, only about 50,000 are free from ice. A vast ice cap of snow and ice, rising to a height of 9,000 feet, covers the interior and slopes gradually down to the

coast. Here icebergs break off and travel down the Atlantic as far south as the Grand Banks off Newfoundland.

During the second World War, the United States was leased important bases which were used for the protection of shipping and air routes to Europe.

The vegetation of coastal Greenland is of the Arctic type with no forests but with small, dwarf-like trees. Caribou are still found



Trade Routes of the North Atlantic.

in the more northerly districts and polar fox, Arctic hare, polar bear and the white arctic wolf abound on the island. The temperature is low, rarely rising above 46° F in the month of July and in January falling as low as –90° F in the interior.

Industries.—The main industries of Greenland are fishing, whaling, sealing and the mining of the three minerals found on the island. The cryolite ore deposits are the largest in the world and graphite and native iron are also found in some quantity. The chief exports, which are sent mainly to Denmark, are cryolite, whale and seal oils, eiderdown, fox pelts and fish.

ICELAND

Iceland is an island situated 250 miles from the south-east coast of Greenland and 600 miles west of Norway. It was occupied by British and United States' forces during the second World War with the object of protecting the northern sea-lanes. In 1944, the Act of Union with Denmark was repealed and Iceland became a Republic.

Iceland is an ice-covered plateau, or tableland, of which only the lowlands are habitable. The interior consists of mountain masses of volcanic origin, several of which are still active. The climate is milder than would be expected for the latitude, being tempered by the warm North Atlantic Drift on the south coast. As in Greenland, there are no forests as we know them, the highest trees being about 10 feet in height. The natural scenery of the island is of great beauty with glaciers, lava streams, vast tracts of heath and grasses and deep bays and fjords along the coastline.

Fish are very plentiful both on the island and around the coast and the fisheries are one of Iceland's most valuable industries. Trout are found in the inland lakes and streams, salmon in the rivers. Off the coast are shoals of cod, haddock, halibut, sharks, and whales.

Sheep, cattle, and ponies are reared by the islanders and these, with their relative products, and salted fish and fish oils, constitute Iceland's main exports.

With the rapid development of air travel, Iceland has become an important stepping-stone on the northern routes to Europe. As an air-base, both civil and military, Iceland is in a very strategic position.

EXERCISES

1. In spite of its comparative nearness to Europe, Halifax will never ship to European countries the amount of foodstuffs shipped by Vancouver and Montreal. Give reasons for this statement.

2. Why is Nova Scotia called 'the land that was passed by'?

3. Why has Grand Falls, N.B., extremes of temperatures when it is situated so near the Atlantic Ocean?

4. Compare and contrast the fisheries of Nova Scotia with those of: (*a*) British Columbia, (*b*) Quebec, as to kinds of fish caught, value, and markets.

5. What are some of the return cargoes brought by ships carrying fish to the West Indies?

6. What conditions make the development of agriculture in Newfoundland difficult? Why can oats be grown where other grains will not survive?

7. In the days of wooden walls Nova Scotia was famous for her shipbuilding. Why did this industry decline in importance?

8. In what ways would the deepening of the Saint Lawrence Seaway affect the Maritime Provinces?

9. How will the development of Labrador iron ore likely affect the Maritimes?

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9

THE SAINT LAWRENCE BASIN

The Great Lakes and St. Lawrence River lie in a glaciated area at the base of the Old Canadian Shield Mountains. Spurs and ranges of the Appalachians form the southern rim as far west as Lake Erie. Ascending the St. Lawrence from the gulf we find that old ribs of the Laurentian Highlands reach boldly down to the water along the north shore, as far as Quebec City. Along the southern shore, from Gaspé to Levis, the Shickshock and Notre Dame Ranges leave a gradually widening plain. The Canadian National Railway has been built through this section and there are good highways as well.

The real plains or lowlands of the St. Lawrence basin begin at Quebec. They stretch in a south-westerly direction on both sides of the river, gradually growing wider until, at Montreal, the lowland plain is 120 miles in width. This part is known as the Montreal triangle. Near Pembroke a low ridge of broken country—a low spur of the Laurentian Highlands—projects to the south, crossing the St. Lawrence between Brockville and Kingston to join the elevated Adirondack region of New York State. Beyond Kingston, the lowlands occupy that portion of the Ontario peninsula lying between Lakes Ontario, Erie, and Huron, and bounded on the north by rugged hills, which extend from the Georgian Bay to the Ottawa River.

The St. Lawrence lowland has a length of about 600 miles and an area of more than 35,000 square miles and is but a small section of the great interior lowland of North America. (See p. 76). It is nearly all fertile land, suitable for farming. The Montreal triangle, east of Brockville, has an area about equal to that of Holland. The Ontario triangle is larger in area and contains some of the finest agricultural land in Canada. The lowlands of the St. Lawrence may be considered as the heart of Canada. Nearly 90% of the population of Ontario and Quebec lives in this region. Here we find the two largest cities of Canada, the greatest amount of manufacturing, and the most valuable agricultural production.

The St. Lawrence River system.—The drainage basin of the St. Lawrence embraces an area of 565,000 square miles, and includes part of Ontario and Quebec, and a narrow strip of the United States from Pigeon River to the 42nd parallel in the State of New York. Within this great area we shall find wide variations in soil, climate, and products.

The old Laurentian Mountains and the glaciated area of the Canadian Shield lie to the north, with the Notre Dame Range of the Appalachians forming part of the southern side of the river basin. The divide between the Ohio River and the Great Lakes is so low that it does not show clearly on the usual small atlas map.

The St. Lawrence River system, including its gulf, river stretches, lakes, and canals, provides a navigable inland waterway extending 2,340 miles from the Strait of Belle Isle into the heart of the continent. This is a unique geographic factor, and is not found in any other river, with the possible exception of the Amazon. Eastern Canada has been built largely around the St. Lawrence waterway. The low divide which separates Lake Michigan from the Mississippi basin has been another factor leading to the development of trade with the interior of the continent, and will be mentioned again.

The source of the St. Lawrence is the chain of lakes which we know as the Great Lakes. These lie in deep glacial grooves whose southern outlets were dammed by the glacial deposits of the retreating ice-masses, and by the subsequent rising of the land which followed upon the removal of the ice. Lake Superior lies at the base of the Canadian Shield. The northern shore is rugged, with high rock cliffs; the southern shore is somewhat lower. Hundreds of streams pour their waters into this great catchment basin, and form a water area of 31,810 square miles, the largest freshwater lake in the world. The outlet by St. Mary's River is over a rocky ledge, with a gradual drop of twenty-one feet to the level of Lake Huron. The rapids of the Sault Ste. Marie are not navigable, and canals have been built on both sides, so that large vessels may pass from the great inland freshwater sea of Lake Superior, to the equally large area of the Michigan and Huron lakes. These are the famous 'Soo' canals, and freight steamers, 600 feet long, pass through in safety. The Canadian Canal is 7,067 feet in length, with a lock 900 feet by 60 feet with a depth of 20 feet. There are now three large locks on the American side of the 'Soo'. These parallel locks handle a greater tonnage of shipping than

either the Panama or Suez Canal, in spite of the fact that they do not operate during the winter months.

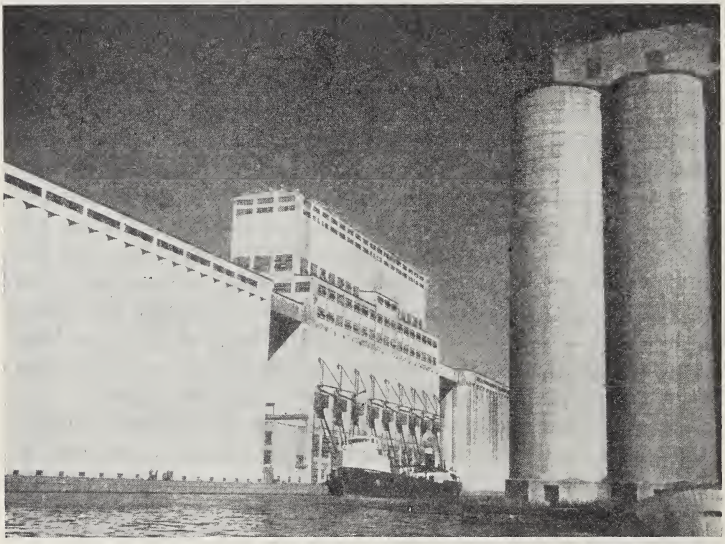
There is deep-water navigation through Lake Huron and into Lake Erie by way of the St. Clair River, Lake St. Clair and the Detroit River. Thence boats may pass to the foot of the lake where the Niagara River and Falls bar the way. The drop of 326 feet has been overcome by the Welland Canal, which extends from Port Colborne on Lake Erie, to Port Weller on Lake Ontario, a distance of 27.6 miles. The new Welland Canal was opened in 1931 and has eight locks, with a depth of thirty feet over the sills, and will permit the largest upper-lake vessels to proceed as far as Prescott before breaking cargo.

Near Kingston, a toe of the Canadian Shield crosses the river valley and the waters of Lake Ontario flow out between the wooded shores of the Thousand Islands, the partially submerged tops of the old mountain range. Between Lake Ontario and Montreal the St. Lawrence River drops 220 feet in a distance of 170 miles. In order to avoid the numerous rapids six canals are used. The locks have a minimum length of 270 feet, a width of 45 feet, but only 14 feet of water on the sills. These locks are too small for the large lake freighters. Canada and the United States have discussed the development of this section of the river so that large steamers may descend to Montreal and so that ocean vessels may go up the lakes. No agreement has been reached as yet.

At Montreal harbour (fifty-six feet above sea-level), a clear channel of thirty feet in depth has been dredged through to the shallows of Lake St. Peter, and it is planned to deepen the channel to thirty-five feet. Montreal is a thousand miles from the Atlantic, but ocean-going vessels come up to this port to load; it is the head of navigation.

The grain route.—Until the opening of the Panama Canal, Montreal was Canada's great grain port. But the rapid growth of export through Vancouver of late years has raised a sturdy competitor for the old metropolis of eastern Canada. There is, however, plenty of grain flowing eastward, and Montreal is still the greatest Canadian grain-exporting centre for eastern shipments. Let us trace a shipment of grain from the prairies to Liverpool. Leaving Indian Head, our carload of wheat will arrive in the Winnipeg freight yards of Transcona. These are very large and cover several hundred acres. There are miles of parallel tracks, and thousands of box cars, some loaded, some empty. Our grain train is assembled, and we soon strike into the rocky, rough coun-

try of the Canadian Shield. It is a little over 400 miles to Fort William and Port Arthur, the elevator towns on Thunder Bay. Here we see great elevators lining the shore for miles. They range in capacity from the great one of 10,000,000 bushels capacity to the small fry of 2,000,000 bushels. One of these elevators will soon empty every box car in our train of its load of 1,600 bushels. The grain is cleaned, weighed, inspected, and graded; if necessary, it is dried to a proper moisture content. It is now ready for shipment to the markets of the world. The twin cities of Fort William



Courtesy C.N.R.

Freighter loading grain at world's largest elevator, Port Arthur, Ontario.

and Port Arthur provide storage for 86,000,000 bushels of grain, the largest grain storage unit in the world. Canadians may well be proud of their achievement of the last thirty years, in bringing their grain to market, so that it has set a world standard of excellence in 'No. 1 Hard'.

Long, low freight boats lie alongside the elevators, and load through a number of hatches from the pipes which come down from the elevator. From the time the grain leaves the box cars it has not been touched by hand. The whole process has been mechanical. Some of the larger boats can carry 500,000 bushels of grain.

Our grain ship steams down the lake, through the 'Soo' canal,

and on through Lake Huron. Here we have a choice of routes. We may unload at either Port McNicoll or Goderich, and return for another load at Fort William. A large amount of grain follows this route, by ship to Georgian Bay, by rail to Montreal. The completion of the new Welland Canal is changing this practice, for the majority of ships now proceed by the all-water route via Lake Erie, Welland Canal, Lake Ontario, and down the St. Lawrence (and canals) to Montreal. The large vessels unload at Prescott or Kingston into smaller vessels. This takes time, and during the rush season it is impossible to force through the twenty-two St. Lawrence locks the volume of grain coming down the upper lakes. Georgian Bay ports may be considered relief valves during the season of high pressure.

One other route offers its services. Our ship may tie up at Buffalo and unload at the large terminal elevators provided by that ambitious city. The grain is then shipped by rail or the New York State barge canal to New York. The bulk of the grain exported through Buffalo comes at the end of the season of navigation on the St. Lawrence, and many 'last cargoes' tie up at Buffalo about the end of November and the first two weeks in December. It is doubtful if the people of Buffalo were at all anxious to see the completion of the Welland Canal. This great engineering feat has removed one of the geographic factors which made Buffalo a great lake port. It is the endeavour of the Canadian Government to provide Canadian outlets for Canadian grain. The port of Vancouver, the Hudson Bay Railway, and the new Welland Canal are all designed to that end.

Grain is always in a hurry. Harvest time is a rush to avoid rain and snow. Transport of the grain is a rush to get to tide-water before crops from Australia or Argentina can depress or influence the market. The prairie farmer wants his crop money in order to pay his bills. The manufacturer wishes to collect from the retailer, and the banks from both. Nature has intensified the rush to the Atlantic seaboard. The Great Lakes and the St. Lawrence are closed to navigation from four to four and a half months each year. The following table shows this in detail:

Average opening of the St. Lawrence at Montreal:
April 15 (earliest March 31, latest May 5).
Average closing of the St. Lawrence at Montreal:
December 15 (earliest Dec. 2, latest Jan. 7).

In spite of this handicap, Montreal ranks close to New York as a great shipping port. It should also be noted that corn and wheat from Chicago, Milwaukee, and Duluth are exported during the

summer months by the all-water route to Montreal. This trade has amounted to eighty million bushels in some years. Elevators have been built at Saint John and Halifax in an effort to divert Canadian grain through these open ports during the closed season on the St. Lawrence. But the long rail haul, in comparison with the short rail haul from Buffalo, or from Montreal to Portland, has prevented more than a small trickle of grain from finding its way to maritime province seaports. The best solution for winter export seems to be by way of Vancouver and the Panama Canal to Europe. This is proved by the phenomenal growth of Vancouver shipments, which have reached a total of a hundred million bushels.

Forests of the St. Lawrence.—When Jacques Cartier sailed up to Montreal in 1534, an almost unbroken forest covered the drainage basin of the St. Lawrence. This was a mixed forest region, where evergreens stood side by side with the broad-leaved hardwoods. The forest was so continuous, the trees were so large, and the winter climate so severe that settlement was slow in making any headway. If we add to this the hostility of the Iroquois it is easily seen why the population of New France in 1763 was less than 70,000, while the population of the Atlantic coastal plain numbered 1,500,000.

The course of settlement followed the river and spread back to the encircling rim of the Laurentians and the Appalachians. In those days the forest was an encumbrance, the trees were cut down, piled, and burned. The people of the United States had all the timber they needed for their own use and there was little demand in Europe. The spruce, fir, pine, and hemlock of the St. Lawrence were not saleable; there was no market. The maple, beech, birch, walnut, ash, and oak were equally useless. One of the earliest exports from the Canada of 1763-1863 was potash, made from ashes of trees which had been piled and burned during the process of clearing the land for agriculture.

Today the situation has completely changed, and what is now left of the forest wealth of Ontario and Quebec is one of the great assets of these provinces. This is due to growth of population in European countries and a demand for timber and lumber from North America to supplement their dwindling supply; also to the growth of population in the United States, and to the reckless treatment of its forests during the last hundred years. The Laurentian Shield forests are one of the last great stands of merchantable timber in America.

For purposes of more detailed study, we shall divide the St. Lawrence Basin into regions, as follows: (i) Southern Ontario, including the Ottawa Valley. (ii) The St. Lawrence Basin of Quebec.

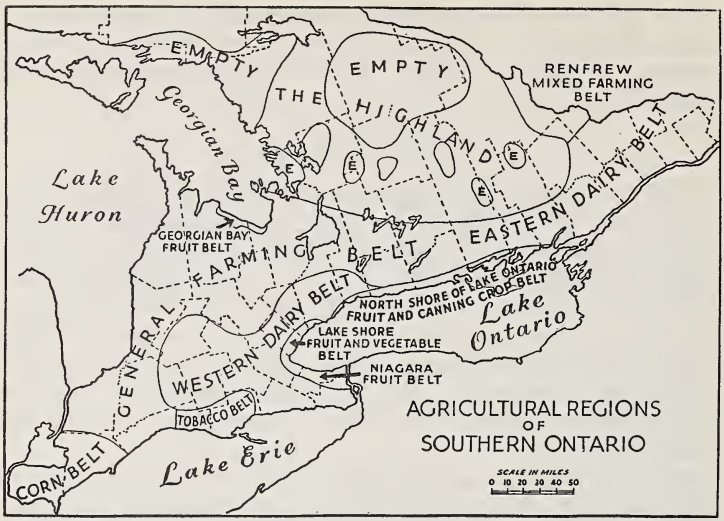
(*i*) *Southern Ontario*

Ontario is second in size among the provinces of Canada. With a total area of 412,000 square miles, it is larger than France, Germany and Holland combined. From north to south it extends through 16° of latitude, a distance of 1,075 miles, while its greatest distance from east to west is also 1,000 miles. Pelee Island in Lake Erie is in the same latitude as Naples, Italy, or Eureka, California, while Port Severn on Hudson Bay is in the same latitude as Moscow. Ontario has 680 miles of salt water shoreline on Hudson Bay and almost 2,400 miles of freshwater shoreline on the Great Lakes.

Northern Ontario, comprising nine-tenths of the total area, is underlain by the Precambrian rocks of the Canadian Shield and has already be discussed in Chapter 7. Southern Ontario, on the other hand, lies on Paleozoic formations, composed of limestone, shales and sandstone which have relatively horizontal surfaces. An overburden of glacial deposits, rich in lime, but mixed with granite boulders from the Shield, forms the parent material for large areas of agriculturally useful soils.

Climate and Vegetation.—Southern Ontario has a continental climate but its winters are not so cold as those of Northern Ontario or the Prairie Provinces, being modified by the presence of the Great Lakes which also tend to keep the summer temperatures from rising too high. Mean temperatures at Toronto, on Lake Ontario, range from 20° F. in January to 70° F. in July. Very seldom does the temperature fall below zero on the coldest winter nights, and only occasionally does it rise to 100° F. on the hottest summer days. The surrounding water also serves to check the occurence of killing frosts in spring and fall. Precipitation in Southern Ontario ranges from 30 to 36 inches per year, uniformly distributed throughout the year, although summer droughts occasionally occur. The ground is usually snow-covered for two or three months.

In contrast to the evergreen coniferous woodland of the north, Southern Ontario has forests of deciduous hardwood trees, although they have very largely been cleared to make the land available for agriculture. Some of the common trees are sugar maple, beech,



red oak, white oak, hickory, butternut, basswood, and white ash. There are some evergreens, also, including white pine, hemlock and white cedar. In many areas the forest has been too completely removed, allowing the water to run away too quickly in the spring before it has a chance to soak into the soil and repenlenish the ground water. The natural tendency of Ontario rivers to flood is thus intensified and the effect of summer drought increased.

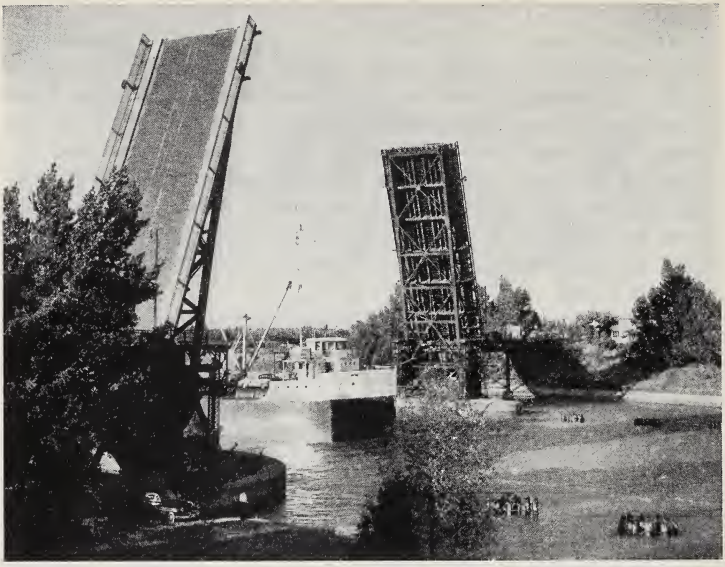
Settlement and Population.—The first wave of settlers reached the northern shores of the St. Lawrence River and Lake Ontario in the 1780's, at the close of the American Revolution. These were the United Empire Loyalists. Soon they were joined by thousands more who came direct from the British Isles. Together they attacked the forest, as did their children and their grandchildren. After a century of clearing and burning, an area of 14,000,000 acres was brought under the plough. By 1881, Ontario had 1,900,000 people and the maximum density of rural population had been reached.

The census of 1951 disclosed a population of 4,600,000 in the province, of whom more than 4,000,000 lived in Southern Ontario and over 70% were urban dwellers. The number of people actually living on farms has declined until it is now less than one-eighth of the total. Ontario has become a land of cities.

Agriculture.—The pioneer Ontario farm was a general farm. Apart from a very few imported articles it had to produce everything needed by the farm family. Clothing was made from wool and flax grown on the farm and shoes and harness were made from home-tanned hides. Home-made tallow candles gave light in the log houses where the furniture was also home-made from wood obtained on the farm. Wheat flour and oatmeal were obtained from home-grown grain, ground at the nearest water-driven grist mill. There was little for sale and, indeed, the early towns and villages along the water front did not create a great demand for farm products at first.

During the nineteenth century, wheat became the most important crop and was shipped from every little port in Southern Ontario. Entering the United States duty-free, it was shipped to New York through the Erie Barge Canal. When the Reciprocity Agreement was ended in 1866, Ontario wheat moved to overseas markets through St. Lawrence ports. By the end of the century, western wheat was beginning to displace Ontario wheat on the world market and mixed farming replaced grain growing on the farms of Ontario. During the present century, growing cities have created a demand for dairy products, fresh fruits and vegetables, and canning crops so that some areas have become highly specialized.

The map on page 124 shows the pattern of agricultural regions which have developed in Southern Ontario. The extreme south-west is the warmest area; in the Corn Belt, husking corn, sugar beets, fruits, tobacco, canning crops and early vegetables are produced. Along the north shore of Lake Ontario are many areas which produce apples and canning crops such as peas, tomatoes and corn. The Niagara Fruit Belt specializes in grapes and peaches Apples and some canning crops are grown on the south shore of Georgian Bay. A large area of sandy soils on the north shore of Lake Erie has become the Tobacco Belt, producing most of the Canadian supply of cigarette tobacco. In all of these special areas, nearness to the lakes has the effect of lessening the danger of killing frosts and thus lengthening the growing season. There are two large areas where dairy farming is important. The western belt is mainly concerned with supplying fluid milk to large cities such as Toronto, Hamilton, London, the Grand River group and the Niagara area. The eastern belt supplies the cities of Kingston, Ottawa and, to some extent, Montreal; its chief importance, however, has been as the source of Canadian Cheddar cheese. Creameries and condenseries are found in both areas. Beyond the dairy areas, both in the south-western peninsula and in the Renfrew area



Courtesy Ont. Dept. of Travel and Publicity
A Scene on the Welland Ship Canal.
Note the operation of the locks and drawbridge.

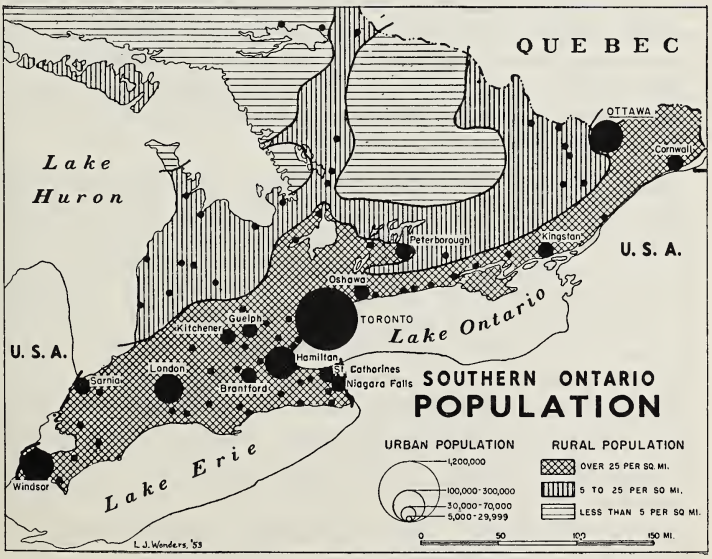
more attention is given to the raising of beef cattle and hogs. In many areas there are special poultry farms but poultry raising is also widespread on the general farms of the province.

Southern Ontario has a prosperous agriculture; its farmers receive a greater cash income than those of any other Canadian province. Cattle, hogs, dairy products, poultry and eggs account for nearly three-quarters of the annual total, while tobacco, vegetables, wheat, fruits and corn are the most valuable cash crops. Not only does the climate encourage the production of a great variety of produce, but the cities of Ontario provide a nearby market for almost everything that is produced.

Manufacturing.—Manufacturing began in Ontario to meet the needs of a pioneer society. At one time every village had small industries in which artisans laboured to produce the personal and occupational needs of the settlers. Such industries usually had a closer relation to the needs of the population than to the natural resources of the immediate area. Sawmills, grist mills and woolen mills were established on many rivers and even smaller streams. Many Ontario towns and cities have grown up around such mill-sites while many others have disappeared. The abundance of

hardwood lead to the establishment of furniture factories by skilled cabinet makers from Britain and the United States. The expanding agricultural settlement encouraged the manufacture of implements, wagons and carriages.

The opening of western Canada provided a wider market and the imposition of duties on imported goods encouraged the Ontario manufacturer. Towns with good railway services began to grow while industries in remote villages stagnated. Many failed outright, others moved to new locations in the towns. The sons of pioneer artisans became managers and family enterprises became joint stock companies in order to finance their growth. When long-distance transmission of electric power became possible, Niagara Falls became the 'engine' for industries in Hamilton, Toronto, Brantford, Kitchener, and eventually, in all the smaller towns as well. More than one-quarter of all the industrial activity of Canada is located around the western end of Lake Ontario. Nowadays power is brought to this area from the Ottawa and St. Lawrence Rivers also. Besides the growth of local companies, this area has attracted many branches of industries in the United States and Britain. Although strongly centralized, manufacturing industries are also widespread. More than one hundred towns and cities in Southern Ontario each produce over one million dollars worth of



Southern Ontario Population

manufactured goods annually and together account for nearly half of the Canadian total.

Southern Ontario is geographically very similar to the adjoining 'North-eastern Industrial Region' of the United States. It has similar transportation facilities and can draw on the same sources of coal and iron, although it has no local supplies. Consequently Southern Ontario produces a similar range of manufactured articles. Branch factories in Ontario are able to import many parts from the United States where, because of the greater volume of production, they can be made more cheaply in the parent plants.

Among the more important industries in Southern Ontario are primary iron and steel, motor vehicles and parts, electrical goods, farm implements, machinery of all kinds, textiles and clothing, rubber goods, petroleum products, meat packing, flour milling and miscellaneous food preparation. Large factories for motor vehicles are located at Windsor, Oshawa, Hamilton, Oakville and Chatham. Parts are made in St. Catharines, Kitchener and many other places. Rubber goods including automobile tires and footwear are made in Kitchener, Toronto and New Toronto. Petroleum is refined at Toronto, Port Credit, Clarkson and Sarnia. Large lake tankers bringing Alberta oil from the head of the lakes may dock at all of these waterside refineries. Sarnia also receives supplies by pipe line from the United States. During the Second World War, a large synthetic rubber plant was erected at Sarnia. Hamilton is the greatest iron and steel centre in Canada; there are blast furnaces at Port Colborne and steel mills at Welland and Swansea. Shipbuilding is located at Port Weller on Lake Ontario and at Collingwood and Midland on Georgian Bay.

Transportation.—No section of Canada is so well provided with transportation facilities as Southern Ontario. The Canadian National Railway and Canadian Pacific Railway have lines to every important point, making easy connection by way of their transcontinental lines to all of Canada, and the United States. American lines also make direct connection with Ontario cities, entering at Windsor, Niagara Falls and Cornwall. Ontario has over 73,000 miles of highways, most of which are in the southern part. About 8,000 miles have hard surface, while 50,000 miles are surfaced with gravel or crushed stone. More than 1,000,000 motor vehicles are registered in Ontario. Railway and highway nets in Southern Ontario are quite dissimilar, yet they focus on the same nodes, corridors and gateways. This is particularly noticeable around the western end of Lake Ontario.

In the Great Lakes and the St. Lawrence, Ontario has a share in the greatest inland waterway in the world. From the outlet of Lake Ontario to the head of Lake Superior, a 1,200 mile route is navigable for vessels drawing 25 feet. The 327 feet of difference in the levels of Lake Ontario and Lake Erie is overcome by the Welland Canal which was completed in 1931. It has an annual traffic of more than 12,000,000 tons and is a very important factor in bringing coal, oil, iron ore and grain to the manufacturing region of Southern Ontario. The usefulness of the Great Lakes route will be much enhanced when the St. Lawrence Seaway is built, enabling large ships to pass from Lake Ontario to Montreal. The waterborne commerce of Ontario is greater than that of any other Canadian province, while Hamilton and Toronto each handle more cargo than any other Canadian ports except Montreal and Vancouver.

Air transport is now well developed in Canada and Ontario has shared in this service from the beginning. There are airports near most cities while the great airports at Ottawa and Malton are very much in use by Trans-Canada and other long-distance airlines.

Power.—The small manufacturing plants of the early days were powered by small water-wheels or by wood-burning steam engines. Later coal was imported from the United States. This century has seen the harnessing of the Niagara, the St. Lawrence and the Ottawa to make available more than 2,500,000 h.p. Transformed into electrical energy, it is distributed by the Ontario Hydro-Electric Power Commission. Nearly 1,000 cities, towns, villages and rural municipalities share in this development, making it one of the largest publicly owned public utilities in the world. The demand for power is increasing. The Niagara system is being greatly enlarged and it is hoped that the international section of the St. Lawrence may soon be developed. Meanwhile large steam-driven electric stations have been built at Toronto, Hamilton and Windsor to alleviate seasonal shortages. The publicly owned power systems of Ontario must be given much of the credit for the development of this important industrial area.

The Cities of Southern Ontario.—Cities have developed rapidly during the twentieth century. Industrialization and urbanization have gone hand in hand. Hard surfaced highways and motor transportation have led to the development of great suburban areas. Of fifteen metropolitan cities in Canada, five are in Southern Ontario, namely: Toronto, Ottawa, Hamilton, Windsor and London. All have populations of more than 100,000. There are ten other urban areas having populations of 30,000 to 100,000.

Toronto, with a metropolitan population of 1,200,000, situated about forty miles from the western end of Lake Ontario, on the north shore, is the capital and largest city in the province. Selected as a settlement site because it has the best natural harbour on the north shore of Lake Ontario, Toronto had a head start which enabled it to become the central node of both the railway net and the provincial highways when they were built. Still important, Toronto harbour handles about 4,500,000 tons of cargo per year, consisting largely of incoming coal and oil. At Malton, Toronto has also the most important air port in Southern Ontario.

With over 4,000 factories, Toronto has an exceedingly diversified manufacturing industry accounting for one-quarter of the total Ontario production of manufactured goods and one-eighth of that of all Canada. Among the more important lines are meat packing, farm machinery and metal goods of all kinds, clothing and foot-



Courtesy O.N.R.

Downtown section of Toronto, showing Canadian Bank of Commerce Building, tallest in the British Empire at the right, and the new Bank of Nova Scotia Building, (flying the Union Jack) at the left.

wear, electrical goods, chemicals, foods and beverages, and printing. Toronto is also an outstanding market and financial centre. It has the largest retail trade in Canada and is a close rival of Montreal in wholesale and financial matters. The head offices of five chartered banks are located in Toronto, while the Toronto Stock Exchange is the second largest in the world in volume of trading.

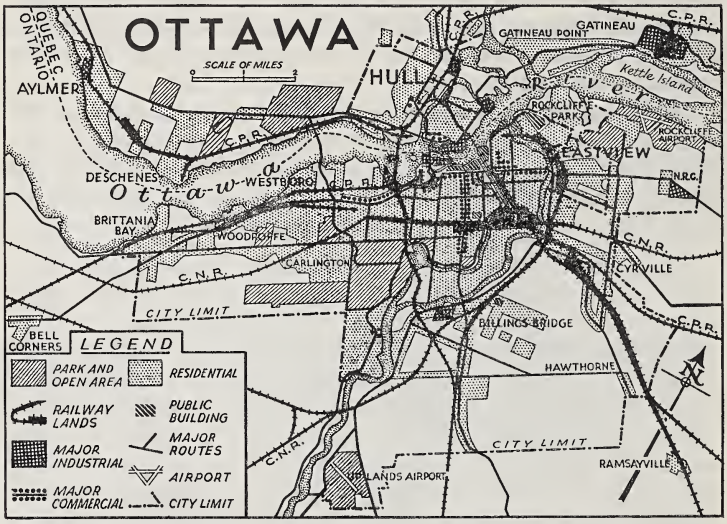
The University of Toronto, with its affiliated colleges, is one of the largest English-speaking universities in the Commonwealth. Other points of interest in the city are the Ontario Parliament Buildings, the Royal Ontario Museum, the Toronto Art Gallery, and the Exhibition Park, where the Canadian National Exhibition, the Royal Winter Fair, and the Canadian International Trade Fair are held each year.

With one-quarter of the population of Ontario and one-twelfth that of Canada, Toronto is an outstanding example of 'big city' development. So strongly are industry, business, services and culture centralized in this metropolitan area, that mere distance from Toronto is now a major geographic factor of the region.

Hamilton (260,000), forty miles west of Toronto, also has a large natural harbour. Although not important in the early years, its activity now surpasses that of Toronto, handling about 6,000,000 tons of cargo per year, the chief items being iron ore and coal. Hamilton is the greatest centre of primary iron and steel production in Canada. It is an outstanding example of modern industrialization, ranking third among Canadian cities in capital invested, employees, wages and value of product. Other industries include agricultural and textile machinery, automobiles, electrical goods, hosiery and knitted goods, pottery, chemicals and food products. Hamilton is the seat of McMaster University. Other features are the city fruit and vegetable market, the Royal Botanic Gardens and Hamilton Rock Garden.

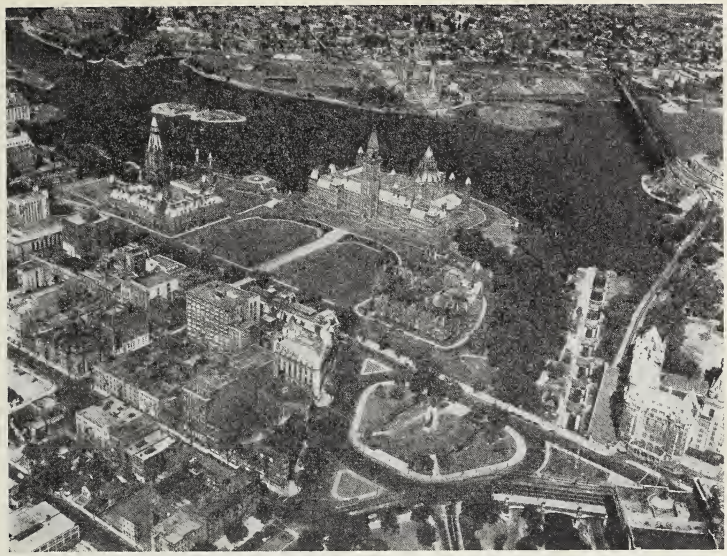
Ottawa is the capital of Canada and third most populous city in Ontario. Including Hull and other suburban areas which lie in the province of Quebec, the metropolitan area has over 280,000 people. The various departments of the Canadian government employ more than 25,000 people or twenty-five per cent of the gainfully employed. The chief industries include paper products, printing, wood products, machinery and food products. Manufacturing employs less than half as many people as the Civil Service.

The outstanding features of the urban landscape are the Parliament Buildings, situated on a hill overlooking the city and the Ottawa River. There are also many other public buildings including the Supreme Court, the Bank of Canada, the National Gallery, the Mint and the Dominion Archives. Two outstanding institutions are the Central Experimental Farm and the National Research Council. Noteworthy also is the well-planned system of parks, boulevards and driveways. There are two airports: Uplands, used by Trans-Canada Airlines and other commercial aircraft, and Rockcliffe, which is used by the R.C.A.F.



Windsor (158,000) is situated in the south-western part of the province just across the river from Detroit, with which it is connected by bridge, tunnel, and ferry services. When Detroit became the foremost American city in the automobile industry, Windsor became the Canadian counterpart. Other industries also whose headquarters were in Detroit and nearby cities established branches in Windsor. The city stands fourth in Canada in terms of value of manufactured goods.

London (122,000) is the fifth and smallest of Ontario's metropolitan cities. Situated in the centre of a relatively prosperous district, well supplied with transportation routes, it is probably the best example of a 'regional capital' in Ontario. Important as a trade centre it also manufactures railway locomotives, hosiery,



Courtesy Photographic Survey

Ottawa, the site of Canada's parliament buildings, overlooking the Ottawa Valley. Hull is on the far side of the river.

leather products, paper products and miscellaneous foods and beverages. It is the seat of the University of Western Ontario.

St. Catharines (67,000), near the Lake Ontario end of the Welland Canal, is the largest city of the Niagara region. St. Catharines and its satelite towns manufacture automobile parts and machinery of all kinds, electrical apparatus and supplies, pulp and paper, tools, hardware, wines and canned goods. Surrounded by orchards and vineyards it is called 'the Garden City'.

Niagara Falls and its suburban area has a population of 40,000. Noted as a scenic tourist resort area, it is also an industrial city of some importance and a transportation 'gateway' to the United States. Other towns of the Niagara region are Welland and Port Colborne on the Welland Canal, and Fort Erie, which is connected with Buffalo by way of the Peace Bridge. Taken together the industrial wealth of the Niagara region ranks with that of Hamilton.

Kitchener and **Waterloo,** adjoining cities with a population of 64,000, constitute the largest urban group in the Grand River valley. Many of the people are of German ancestry. The 'Twin Cities' have a highly diversified industry, manufacturing tires and

rubber goods, leather and leather goods, furniture, machinery, hardware, beverages and fool products.

Brantford (52,000) is the second in size of the Grand River cities; it is noted for the manufacture of farm implements and other engineering products and for the fact that it was the home of Alexander Graham Bell, inventor of the telephone.

Guelph (30,000) is the third of the Grand River group. It produces stoves, electrical equipment, carpets, leather goods and food products. It is more noted for its institutions including the Ontario Agricultural College and the Ontario Veterinary College. Galt, Paris and Preston are also important Grand River towns. Located astride the river they have often been affected by spring floods. Three large dams on the headwaters now serve to regulate the river.

The Grand River cities together constitute one of the five important industrial areas of Ontario.

Oshawa (52,000), thirty-five miles east of Toronto, is the Canadian home of General Motors.

Peterborough (41,000) on the Otonabee River, is about seventy miles north-east of Toronto and somewhat outside the city belt. It is noted for the manufacture of cereal products, electrical equipment, dairy machinery, canoes and outboard motors. It is the gateway to resort areas on the Kawartha Lakes.

Kingston (50,000), located at the lower end of Lake Ontario, is one of the oldest settlements in Ontario. Long important as a lake port, it has shipyards, locomotive works, an aluminum plant and textile factories. Its educational institutions include Queens University and the Royal Military College. Tourists are attracted by Old Fort Henry and the nearby resort areas on the Rideau Lakes and the Thousand Islands of the St. Lawrence.

Cornwall (32,000) lies about fifty-five miles south-east of Ottawa, on the St. Lawrence River, and is a point of entry to the United States. It manufactures pulp and paper, chemicals, rayon and cotton textiles. It stands to benefit greatly from the building of the St. Lawrence Seaway.

Sarnia (41,000) is sixty miles west of London, at the outlet of Lake Huron. It is an important port and gateway to the United States. It is the location of Canada's greatest oil refineries and a synthetic rubber factory.

The Focus of Ontario—like a wedge cut from the most industrialized section of the United States, Southern Ontario has much of the same geographic advantage and shares in the same activities as its neighbours. The Great Lakes furnish excellent transportation for bulk materials, while power has been furnished by Niagara Falls. While outlying cities have developed and will continue to develop, the economic core of Southern Ontario is found in the urban development around the western end of Lake Ontario. Here, at the mid-century mark, is to be found over twenty-five per cent of Canada's industrial capacity.

(*ii*) *The St. Lawrence Basin of Quebec*

The province of Quebec is the largest in area, and the oldest geographically, of all the provinces. It is rich in historical interest because it was the first province to be explored and settled. The great St. Lawrence River, on whose banks many of the most important cities and towns are situated, cuts the province in half, and in itself explains the reason why the first sturdy explorers of New France were able to penetrate, without too much difficulty so far into the interior. Northern Quebec is almost surrounded by water. The coastline extends from James Bay to Labrador and the Gulf of St. Lawrence, while the St. Lawrence and Ottawa Rivers almost complete the circle. Southern Quebec extends to the forty-fifth parallel.

Three natural regions may be distinguished. These are:

1. The Canadian Shield or Laurentian Plateau of Northern Quebec. (This region has already been discussed in Chapter 7.)
2. The Appalachian Highlands of Southern Quebec
3. The Central St. Lawrence Lowlands

2. *The Appalachian Highlands of Southern Quebec*

The Appalachian region lies east of the great fault running from Levis to the northern end of Lake Champlain. The mountains which form the backbone of this area, while much younger than those north of the St. Lawrence, are much older than the Cordillera of western America. The Appalachians consist of parallel ridges, or synclines, formed by tremendous lateral pressure being exerted against the solid block of the Laurentian Plateau.

Ages of erosion have so scoured the ridges of the Appalachians that they show no bold relief, but remain as rounded, usually wooded, hills. These reach their greatest height in Gaspé Penin-

sula, where they are known as the Shickshocks, rising abruptly from the water's edge to heights over 3,000 feet. Mount Jacques Cartier, 4,400 feet, is the highest point. Much of this region is actually a plateau standing in bold relief above the St. Lawrence lowlands. The edge of this plateau is clearly visible on the Levis side of the St. Lawrence river, opposite Quebec city. Further south the mountain folds rise above the plateau.

Gaspé.—In Gaspé the people are of French and English origin, many coming originally from the Channel Islands. Fishing is the chief industry along the coast, with lumbering and mining in the interior still largely undeveloped. The cod, which form the chief catch, are salted, cured, and shipped to the West Indies and Mediterranean countries. Some lobsters are canned, while some are shipped fresh to Montreal and Toronto. The fighting salmon of Gaspé are highly prized table fish, and there is a good market for them in the cities of eastern Canada. In recent years it has been found that a particularly fine grade of green peas can be grown on the more fertile parts of the peninsula. Strawberries and blueberries find a ready market, since they ripen later than those grown farther inland. The rough, bold scenery and the cool sea breezes are drawing each year more and more tourists to the coves and villages of Gaspé. The chief towns are New Richmond, New Carlisle, Newport, and Chandler, on the Baie de Chaleur.

The Canadian National Railways serve the peninsula. One branch line follows the north shore as far as Matane; another skirts the south shore to Gaspé village. The Perron Boulevard, which completely circles the peninsula, has been a great boon to the settlers, and has made this picturesque part of the province accessible to the rest of the world.

'The South Shore' has an almost purely French population. Here the Notre Dame Mountains are lower, more rolling, and a moderate distance inland from the river. Farming and lumbering are the chief industries. Seaside and riverside resorts attract summer visitors. Rivière du Loup, the largest town, has saw-mills and a pulp mill. On a clear day the high cliffs of the north shore can be seen, about fifteen miles distant. A ferry runs across the river to Tadoussac, at the mouth of the Saguenay. Rimouski is the terminus of another ferry route to the north shore. It is a distributing centre for the adjacent farming district, and at its airport important overseas mail is transferred from steamer to aeroplane for more rapid delivery.

The Chaudière River rises in Lake Megantic near the Maine boundary and begins its course in rough, wooded country where lumbering and hunting are the chief industries. Later it enters what is known as the Beauce Valley, a beautiful stretch of farm land. Much of the maple sugar produced in this district is shipped to the United States to be used in connection with the manufacture of tobacco and cigars. The Chaudière enters the St. Lawrence over falls, not far west of Levis.

Levis, directly opposite Quebec City, was once the scene of important shipbuilding activities. Its dry dock, one of the largest in the world, is still used for ship repair work. The city is an important coal distributing point. Coal from Nova Scotia is unloaded here to be shipped inland by rail.

3. *The Central St. Lawrence Lowlands*

By far the most important region of the province is the relatively small triangular plain lying on either side of the St. Lawrence. The points of the triangle lie at Quebec, Hull, and the northern end of Lake Champlain. At the close of the Glacial Age this area was covered to a depth of 600 feet by the Champlain Sea. Above the sea rose eight islands now known as the Monteregian Hills. Mount Royal is the best known and Brome Mountain (1,755 feet) is the highest. All are of volcanic origin and rise abruptly from an otherwise level plain. The soil of the plain is fertile clay loam, with here and there outcroppings of sandstone and limestone. In the central part of the plain, particularly south of the St. Lawrence, heavy clays are found. Around the circumference of the plain, particularly to the north, are extensive deposits of sand and gravel, brought by the northern tributaries of the St. Lawrence during the retreat of the great ice sheet.

Early settlement.—This part of the province was the first to be settled, and there are still many traces of early French occupation: long, ribbon-like fields stretching back from river or main road, stone houses and white-washed barns, well-sweeps like arms pointing skywards, and even a few old windmills. Even today the farmers are largely French, except along the international boundary north of Lake Champlain, and in the district around Huntingdon.

The Richelieu River runs its entire course across the lowland plain. At St. John's and Chambly rapids and falls obstruct its path. Here canals were built in the early days, since this was,

until the era of railways, the most important highway of traffic between Montreal and the Atlantic seaboard. Canada's first railway joined Montreal and St. John's on the Richelieu, and was considered as supplementary to the river traffic. St. John's is now an important railway centre through which pass lines running south to New York, south-east through Vermont, and east to Sherbrooke and Saint John, New Brunswick.

Farming is an important industry of the St. Lawrence lowlands. The rich clay soil, a generous rainfall (about 40 inches for the year), a moderate summer temperature, and a growing season of about six months give an abundant yield of varied crops. Chief among these are hay and clover, oats, and potatoes. Near Montreal, market gardening, dairy farming, and fruit growing are carried on. Quebec stands first among the provinces in the production of butter. On the low plain south of Montreal there is a large dairy farming industry and much hay is grown. The production of honey is also important. Apples are grown near Abbotsford and Huntingdon, and the tobacco plant is cultivated with success in a number of localities. The varieties grown in Quebec are chiefly used for pipe and cigar tobacco, while that grown in Ontario is used in the manufacture of cigarettes.

Minerals.—Valuable minerals are seldom found in alluvial plains, and this is true of the St. Lawrence lowlands. However, the fine clays of this region are utilized in making large quantities of brick, tile and porcelain. Laprairie, Delson, and Deschaillons have large brick plants. Sewer pipes, tiles, and sanitary porcelain are made at St. John's. Large cement plants are located at Hull and at Montreal East, the material coming from a remarkable deposit of cement rock near the eastern end of the Island of Montreal. Philipsburg, at the northern end of Lake Champlain, has the best marble quarry in Canada. Much of the marble used in the Parliament Buildings at Ottawa came from this quarry.

The Eastern Townships lie north of the international boundary between the valleys of the Richelieu, St. Lawrence, and Chaudière Rivers. The lands in these river valleys were settled by the French, and the long, characteristic, ribbon-like fields of seigneurial origin are to be seen. The fields of the Townships, however, are more nearly square in shape. Although now occupied by both French and English, this land was cleared and settled by Americans who drifted over the border after the Revolutionary War, and by Scotch, English, and Irish settlers from the old land.

Through this district wooded hills extend in three parallel lines from the international boundary. From west to east these are known as the Sutton Ridge, the Stoke, or Sherbrooke, Ridge, and the Megantic Ridge. This last closely follows the Maine boundary. Sutton Mountain, the highest peak, is over 3,000 feet high. Cutting diagonally across these ridges is the Serpentine Belt of igneous rock, in which asbestos deposits occur. Hills, woods, lakes, and sloping valleys make this district one of the beautiful regions of the province.

The higher elevation of this part of the province results in a lower temperature during the winter, and a greater range of temperature in summer, than in the St. Lawrence Lowlands. The growing season is also from two weeks to a month shorter.

Drainage.—A large part of the Eastern Townships is drained by the St. Francis River. Storage dams, built at the outlet of Lake St. Francis, where it rises, and at Lake Aylmer, help to stabilize the flow of the river. Upstream from East Angus the river is used for floating and storing logs. Not far south of Sherbrooke the river makes a right-angled turn and flows in a north-westerly direction. Near Drummondville it flows from the highland region to the St. Lawrence lowlands, which it crosses on the way to the St. Lawrence. It is interesting to note that the sources of both the St. Francis and the Chaudière Rivers are higher by about 1,000 feet than Lake Superior, where the St. Lawrence rises.

Industries.—Farming, particularly dairy farming, is an important industry in the Townships region. At one time, large amounts of cream were sold in the cities of the New England states and the Hudson valley. Maple syrup and sugar, the finest in Canada, are produced here. In fact this is the most important producing region in Canada for these products and much is shipped to the United States.

Three new types of agricultural products raised within recent years in Quebec are: bog cranberries in Nicolet County; flax, chiefly in Vaudreuil County; and sugar beets on the St. Lawrence lowlands. The flax, which is raised for its fibre, is processed at Drummondville and Rigaud. A mill to process the sugar beets has been built at St. Hilaire, across the St. Lawrence from Montreal. Still another specialized product is the large musk melon, grown near Montreal. Many of these are shipped to the United States.

Sheep are pastured on the shorter grass of the hill-sides. Poultry and beef cattle are raised for the Montreal market. Some lumber-



Courtesy O.N.R.

Sugar Bush at St. Hilaire, Quebec.

ing is still carried on and, where power is developed, there are pulp mills and various other types of woodworking industries. Bricks are made in the St. Francis valley from deposits of clay laid down during the period of flooding by the Champlain Sea. Granite is quarried at Beebe and Scotstown.

Manufacturing is also important in this section. Textile plants were established here in the early days, woollen mills, cotton mills and more recently, silk mills. There is easy access for the bulky raw products brought in by rail, chiefly from the United States, and cheap electrical energy has been secured.

Asbestos.—Canada leads the world in the production of asbestos. Nearly all the asbestos produced in Canada is mined in that part of the Serpentine Belt extending from Danville to East Broughton. In 1948 the total production amounted to $42,231,475 in value.

There are three distinct regions of production centred around Asbestos, Thetford, and East Broughton. At Thetford the Bell Mine is known as the most productive asbestos mine in the world. The King Pit, a part of this mine, is over 450 feet deep. From this district the finest crudes and spinning fibres in the world are obtained.

To obtain the asbestos, loose surface rock is first cleared away. Then in holes, made by pneumatic drills, dynamite is placed, and

the solid rock is broken up by blasting. The fragments are removed by steam shovels and loaded on cars which take them to the crusher. After three successive crushings and sortings the rock goes to the drier and then to the mill where it is crushed again, screened twice, and graded. The fibre is then removed from the particles of sand by air-suction and bagged ready for shipment.

Some of Quebec's asbestos is manufactured in Canada, but much is shipped to the United States, England, and France, where it is manufactured into firemen's clothing, stage curtains for theatres, brake lining, building material, and many other useful things.

Sherbrooke (56,000) situated at the junction of the Magog and St. Francis River, is the largest city of the Eastern Townships, and the principal marketing centre. It has a beautiful setting in a fertile valley entirely surrounded by hills. Those early interested in the development of the city realized the necessity for railroads, and were instrumental in bringing about the construction of Canada's first important railway, that connecting Montreal with Portland, the nearest ice-free port. Today two other important lines pass through Sherbrooke, one connecting Montreal with Saint John and Halifax, and one connecting Quebec with Boston. This means that raw products, such as cotton, wool, silk, and iron, have easy entry to Sherbrooke, where available water-power makes possible the manufacture of woollen goods, cotton goods, hosiery, and other articles of silk, both real and artificial, footwear, machinery, scales, and various wares of iron and steel. These varied manufactures are largely sold in the surrounding farming communities, though much is sent further afield.

Other towns of this section are East Angus, Windsor Mills, and Bromptonville, known for their pulp and paper mills. Magog has cotton mills and the largest textile factory for prints in Canada. Drummondville has silk, cotton, hosiery, and flax mills. Cowansville has silk mills and furniture factories, and Coaticook has silk and woollen mills. Granby has a variety of manufactures, the most important being rubber goods. Other small centres in the Townships specialize in the making of shingles, boxes, veneer, clothes-pins, bobbins, and furniture. Victoriaville, the most important of these, makes furniture and other wood products, maple sugar evaporators, silk and clothing. Richmond is an important divisional point on the main line of the Canadian National Railways.

The Island of Montreal, thirty-two miles long and about eleven miles wide, is situated where the Ottawa and the St. Lawrence rivers meet. Almost one-third of the total population of the province of Quebec is found on this island. Many other islands, large and small, lie near its shores. The city of Montreal extends for about ten miles along the south-east side of the island. Beyond the city and its suburbs the fertile farms are largely given over to dairying and market gardening.

Railways and roads cross the island in all directions, radiating from Montreal. Four bridges connect the island with Ile Jésus to the north. At Bout de l'Ile the Canadian National Railway crosses to the north shore. Four bridges connect the island with the south shore, and at Ste. Anne de Bellevue three bridges care for all west-bound traffic. At Ste. Anne de Bellevue is Macdonald College, where the School for Teachers (one of the provincial normal schools) and the faculties of Agriculture and Household Science of McGill University are all housed in a group of fine buildings set in beautiful surroundings.

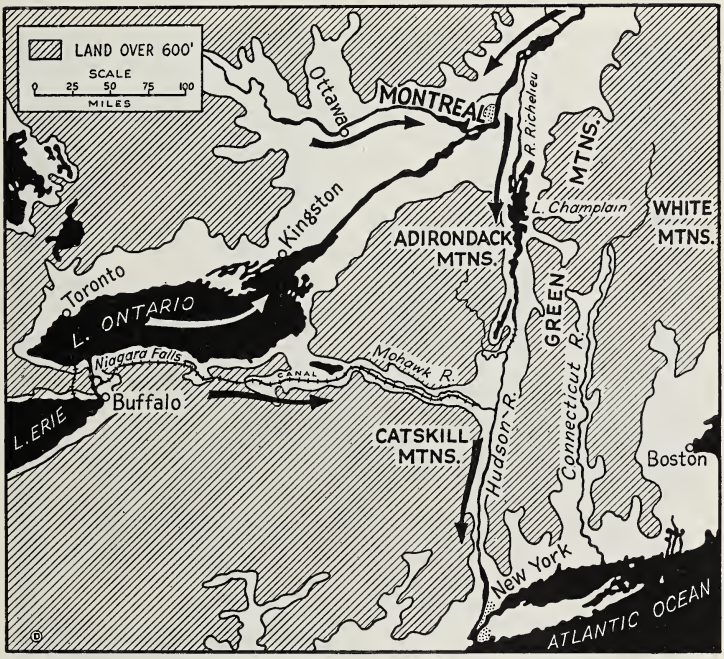
Montreal (1,400,000) is the largest city in Canada, the second Atlantic port, and its French-speaking population is exceeded only by Paris and Marseilles. Its growth and importance depend upon certain natural advantages. It is situated a thousand miles from the open sea, yet ocean carriers may reach its harbour eight months in the year. The canals of the St. Lawrence and Great Lakes make navigation possible for another thousand miles inland. The whole interior of the continent is a hinterland for this port, and in addition we may note the Richelieu-Champlain-Hudson route to the south, with New York at the Atlantic terminus, and the Ottawa Valley leading to the north-west.

At Dorval, near Montreal, is one of the finest air-ports in the world. During the second World War it was one of the busiest. It is the terminus of the Trans-Canada Airways route to both Britain and the West Coast.

From the standpoint of power Montreal is most fortunate. Water-borne coal is brought from competing producers in the United States, Great Britain, and Nova Scotia. Abundant electrical energy turns the wheels of her industries, since the city is in the centre of a low plain surrounded by fault lines or escarpments, over which the tributaries of the St. Lawrence plunge in falls or rapids.

Wheat from the prairies is made into flour and exported. Lumber, pulp, and paper products are assembled and shipped to

foreign ports. Ships from all over the world bring raw products to her wharves. Sugar from the West Indies and British Guiana is refined, and confectionery is manufactured. Crude oil, imported either by tanker or through a pipeline from Portland, Maine, is refined at Montreal East. Tobacco and whisky are manufactured partly from domestic and partly from imported raw products. Cotton, wool, hides, and leather are unloaded at Montreal for distribution to the textile and boot and shoe factories of eastern



THE POSITION OF MONTREAL

Canada. Montreal has the largest fur auction rooms in Canada and manufactures many kinds of fur goods.

One of the largest cold-storage plants in the British Commonwealth is a part of the harbour equipment. The city is the export centre for the surplus bacon, butter, and cheese produced in Ontario and Quebec. Textile mills of all kinds turn out woollen, cotton, and silk goods for the Canadian people. In the production of ready-made clothing, Montreal holds the place in Canada that New York does in the United States. Other plants make boots and shoes. Situated in the centre of an important power-producing

region, it is natural that Montreal should manufacture all types of electrical equipment. Since it is the headquarters of Canada's two great railway systems, Montreal has large locomotive works and repair shops. Many other steel products, both large and small, are made in this busy city which is one of the chief centres in Canada for the manufacture of aeroplanes.

Montreal's harbour extends for about sixteen miles along the water-front. Owing to the closing of the port at the end of November, speed in handling cargoes of all kinds is essential.



Courtesy C.N.R.

PLACE D'ARMES SQUARE, MONTREAL.

With this end in view, the harbour has the most modern equipment; floating and locomotive cranes, electric railway, etc. Huge elevators with a storage capacity of over 15,000,000 bushels can handle the inflow of grain from the west. Using fifteen miles of rubber belting, grain can be delivered at once to steamers in twenty berths, at the rate of 150,000 bushels an hour. Cold storage plants and huge warehouses permit the handling of other cargoes with equal ease.

The Lachine Canal, which passes through a section of the manufacturing district of the island, permits many cargoes to be loaded at the point of production.

The minimum depth of the channel from Quebec to Montreal is thirty feet. During recent years, owing to the fluctuations of the water-level in the Great Lakes, this depth has been difficult, and at times impossible, to maintain. Further dredging of the channel is intended.

Montreal is also an important travel-centre, and there is a large tourist trade. Its old-world charm makes it distinctly different from other Canadian or American cities. Mount Royal gives it a beautiful setting and affords opportunities for winter sports. The spires of many churches are a feature of the sky-line, so that Montreal is often called 'the city of churches'. Two large universities, McGill and L'Université de Montréal, attract students from many parts of the continent.

Montreal is Canada's chief commercial centre. Here are located the headquarters of two great railways, many banks, and a number of insurance and trust companies. The Sun Life Building is the largest office building in the British Commonwealth.

Nearly two-thirds of the population of the city is native French-Canadian. The French and the English associate in business, but each group preserves its language and social customs. Daily papers are printed in both the French language and the English language. Both languages are used on railway tickets and for all public notices. There are separate schools for Roman Catholic and Protestant children. Politeness is noticeable everywhere among all classes of the people.

Quebec (275,000) stands next to Montreal in size and importance in the Province of Quebec. It is located at the north-east point of the lowland triangle where the St. Lawrence River begins to broaden out on its way to the sea. With crowded, narrow streets in Lower Town, stately dignity in Upper Town, and crowned by the citadel, it has a charm unique among the cities of North America. Winter

and summer it is thronged by tourists. On any fine day people from near and far may be seen on Dufferin Terrace. There, with the Château Frontenac behind them, the citadel-crowned Cape Diamond above them, and the river and lower town far below, they look out over a great amphitheatre rimmed on the north by the Laurentians and on the south by the Appalachians, with the Island of Orleans parting the green waters of the river flowing between.

Although Quebec is about 800 miles from the sea, the tidal range is about fifteen feet, which makes it necessary to have floating pontoons for ferry-boats plying to Levis on the south shore.

The city has a variety of industries which include brick making, pulp and paper, tobacco, clothing, founderies, tanneries, and breweries. It is also the centre for the manufacture of boots and shoes.

The harbour of Quebec is open for eight months of the year and is a port of entry for ocean steamers. The water front extends for six miles and the harbour has modern facilities which include berths for the large vessels, cold storage warehouses, grain elevators and two dry docks where ship repairs are carried out.

Among the beautiful buildings of Quebec are the famous Canadian Pacific Railway Hotel, the Château Frontenac, Laval University, and the Provincial Parliament Buildings. Throughout the city one finds a multitude of churches, and any one who has ever visited Quebec will remember the ringing of the bells. About twenty miles below Quebec is the famous shrine of Ste. Anne de Beaupré, visited yearly by thousands of devout worshippers.

Three Rivers (65,000), the next city in importance, is situated on Lake St. Peter, at the mouth of the St. Maurice River. It was founded in 1634, has many very old buildings, and a population largely French. It is a thriving port, and has many manufacturing plants, supplied as it is with the abundant water-power of the St. Maurice River. It has one of the largest paper mills in Canada, large cotton mills, clothing factories, wood-working plants, and iron-works. The first iron produced in Canada was made near Three Rivers from a deposit of bog-iron ore.

Other towns.—St. Hyacinthe, on the Yamaska River, is a thriving city with many industries and some mills. It is particularly well known for its manufacture of organs, which are to be found in many churches and large institutions throughout Canada and the United States. St. Jean, or St. John's, is a growing industrial centre, due to its position at a junction of railway lines, where

bridges cross the Richelieu River. It uses the clay of the surrounding district to manufacture drain pipes and sanitary porcelain, and cans the surplus fruits and vegetables produced nearby. It has an important sewing machine factory and various smaller industries. Farnham, on the Yamaska River, is another important railway centre which is developing a variety of industries. Joliette, at the foot of the Laurentians, is an active industrial centre with a number of mills and manufacturing plants. It is served by two railways and thus has good transportation facilities. It derives its name from its founder, who was a descendant of the famous Louis Joliet, co-discoverer with Marquette of the Mississippi River. Since it is in the centre of one of Quebec's chief tobacco growing districts, it manufactures tobacco products. It also has woollen and paper mills and biscuit factories.

Valleyfield, on the south shore of the St. Lawrence River, 40 miles west of Montreal, has long been known as a centre of the textile trade. With the opening of the Beauharnois Canal, it acquired a fresh stimulus, and now has factories and mills which manufacture a number of important products. One of the most interesting of these is glazed paper, which is now used so widely. St. Jérôme is situated on the North River, 33 miles from Montreal. Like so many of the cities which have grown up on the banks of rivers, St. Jérôme possesses large pulp and paper mills, as well as knitting, grist, woollen, and lumber mills. Rubber goods and cement bricks are also manufactured. Lachute, at the foot of the Laurentians, also on the North River, 50 miles from Montreal, has a large woollen mill and a paper mill. The paper-maker's felt which is manufactured here is shipped to many parts of Canada. Sorel, a busy and thriving port, is situated on Lake St. Peter at the mouth of the Richelieu River. Its grain elevator has a capacity of 2,000,000 bushels. Shipbuilding is carried on in this port, which also possesses a repair plant for the Federal Government and the Canada Steamship Lines.

As mentioned elsewhere, Sorel is the smelting centre for the titanium ore brought from the Allard Lake district, north of the Gulf of St. Lawrence. Its power comes from the St. Maurice Valley.

The People of Quebec.—As everyone knows, the population of the Province of Quebec is predominantly French-speaking. Out of a total population of 3,332,000 in 1941, 2,695,000 were of French origin. A fact that is not as well known, and which will have important effects on the development of our country, is that

Quebec is no longer chiefly an agricultural region. In fact no other province has so large a proportion of urban dwellers. Today fewer than 35 percent of the people live in rural districts, and only 13 percent of the Province's industrial output comes from its farms.

Conservation in the St. Lawrence Basin.—This region has soil types and a rainfall similar to those of north-west Europe. It is only natural then, that although the winters are colder than in the Old Country, people from Britain, France, Germany and the North Sea countries have done well here.

The rocks of the Canadian Shield, the limestone bluffs (like the Niagara escarpment) and rocky plains, and the variety of land forms created by the continental glaciation, make great differences between areas in this region, even within short distances. When the land was settled many of these differences were overlooked and people settled on the rocky lands, the dry areas and around the swamps. Perhaps it was because all the land was covered with trees. When the forests were cut down the differences became more apparent and many people suffered. There is still a great deal to be done in re-settling those who are on poor land and in restoring the forests.

European settlers overlooked two important differences from their old homes, particularly those from Britain. When the snow melted there was far more run-off than they were accustomed to. Also the summer rains were more torrential. Under cultivation for a hundred years or more the soils have eroded on the slopes. When the topsoil has been eroded from the grey-brown forest soils, they cannot absorb and hold water so well, so that even in a humid climate there is plenty of drought. Indeed the most obvious clues to erosion are the dry patches with poor crops.

When towns and cities were built they were usually on rivers which supplied power, navigation, and port facilities and provided easy grades in the valleys for the railroads. However, rivers flood periodically, a little each year and very badly in some years. They go dry in summer, particularly where there are no forests and where land has eroded. Too much water in spring and too little in summer made people think about Conservation. In 1946 the Ontario Legislature passed *The Conservation Authorities Act* and made it possible for the townships, villages, towns, and cities that share a river system to act together to conserve their water, soil, forests and game.

EXERCISES

1. Debate the topic: "Resolved that the deepening of the St. Lawrence waterway to handle ocean-going vessels will prove to be of benefit to the trade of Toronto."

2. How many points can you find in favour of Ottawa as the capital city of Canada?

3. Note the names of the automobiles in use in your district. Can you find the name of the company which manufactures each kind of automobile? Where is each company located?

4. Why is Ontario able to manufacture about half the goods manufactured in the whole of Canada? What advantages of location make this possible?

5. Compare the leading industries of Ontario with those of Quebec. What reasons can you give to explain why:
   (a) Ontario has almost twice as many flour and feed mills as Quebec?
   (b) Ontario manufactures automobiles extensively while Quebec has no such industry?
   (c) Quebec leads in the pulp and paper industry?

Note the remarkable extent to which the industries of the two provinces are complementary; thus Quebec manufactures more cotton goods, silk goods, clothing, boots, and shoes, while Ontario produces more woollen cloth, hosiery, and knitted goods.

6. The low-lying land south of Montreal is one of the best hay-producing regions in Canada. Why is hay grown on this fertile land rather than wheat? Give as many reasons as you can.

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10

THE GREAT CENTRAL PLAINS REGION

LYING between the Rocky Mountains on the west and the Canadian Shield to the east are the Great Central Plains of Western Canada. They constitute the northern portions of two large North American physiographic regions, the Interior Lowlands and the High Plains. (See p. 58) Drainage to the north is by way of the Mackenzie River system and to the east through the Saskatchewan-Nelson system, while a very small section in the south drains to the Mississippi.

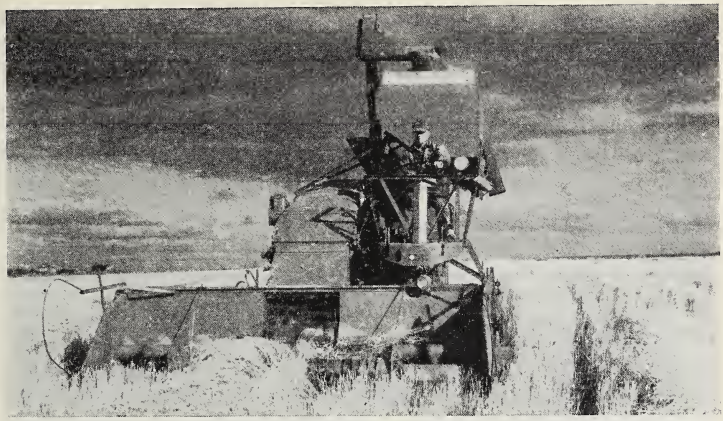
THE ATHABASKA-MACKENZIE BASIN

Although this is the narrowest part of the great plains region, it contains at least 200,000 square miles of plain, and is roughly 200 miles wide by 1,000 miles in length. It extends from the 54th parallel to the Arctic Ocean in latitude 70 degrees. Norway and Sweden have an area of 297,090 square miles, and would almost fit into that part of the Mackenzie basin which lies east of the Rockies and below the 500-foot contour line.

Recent events and world conditions have awakened in North America a new interest in the far north, and already changes are taking place that will alter the values placed on this area. In view of the importance now attached to this northern region, it is dealt with separately and in detail in Chapter 12, page 201.

THE SASKATCHEWAN BASIN

The drainage divide south of the Athabaska River runs eastward to the rocks of the Canadian Shield a little to the north of Edmonton and Prince Albert. On the south, the 49th parallel almost coincides with the height of land which marks the beginning of the slope to the Gulf of Mexico. Between these low divides the central plain slopes to the east, draining by the Saskatchewan and its tributaries into Lake Winnipeg. The Red River flows in from the south and a portion of the plain is seen to lie within the United States. The Winnipeg River brings from the south-east the accumu-



Courtesy C.N.R.

WHEAT FARMING, SASKATCHEWAN
A self-propelled combine in operation on large level grain fields.

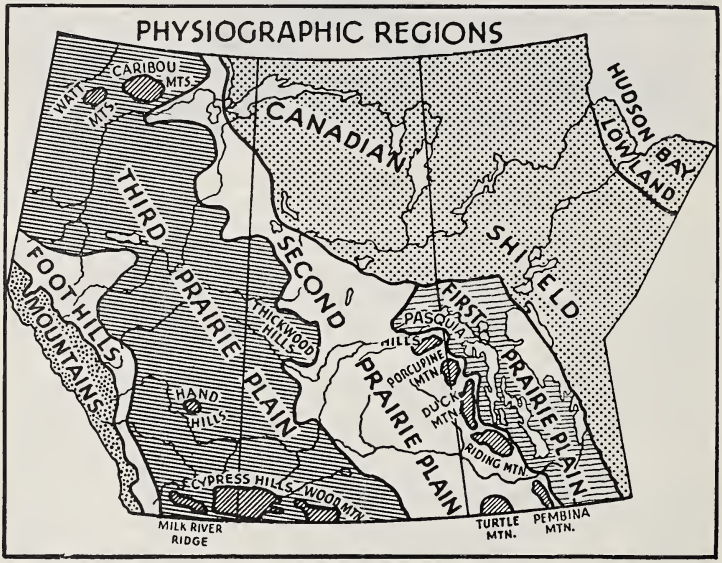
lated waters of Rainy Lake and the Lake of the Woods, which lie on the edge of the Canadian Shield. From Lake Winnipeg the combined waters flow to Hudson Bay by way of the Nelson River, which has cut its course through a low and broken part of the old highland.

The central plain of the Saskatchewan is roughly 800 miles in length by 300 miles in width, and is known throughout Canada as The Prairies. The larger part is prairie, a rolling, gently undulating, grass-covered surface. The true prairie lands gradually merge into park lands along the north Saskatchewan, and trees appear as we approach the foothills of the Rockies. The prairies are comparatively flat, but present three levels which increase in altitude as we go from east to west. The first level was once the bed of a great lake which, at that time, probably drained off to the south by way of the Mississippi. Lakes Winnipeg, Winnipegosis, and Manitoba comprise what is now left of the once large, glacial Lake Agassiz. The result is that the soil of the first level is unusually fine and rich. When the glacier retreated the lakes drained to Hudson Bay and the Red River appeared, winding its way northwards through the soft and gently sloping silt lands to Lake Winnipeg.

West of Lake Agassiz the second prairie level embraces a portion of Manitoba and a large section of Saskatchewan. This land was once under water and in many places is uniformly level, as in the 'flat pan' south of Regina. Other sections are gently rolling,

with the streams in rather deep, wide river valleys. For thousands of years the decaying grasses have added a rich mould to the fine clays of the glacial age, and the soil has been found to be well adapted to the growing of grain.

The third prairie level rises gradually to the foothills of the mountains and acquires an altitude of 3,425 feet at Calgary, and 2,185 feet at Edmonton. Here we shall find the streams in deeper valleys with narrower and more precipitous banks. Throughout this section the soil is equal in fertility to that of the other levels.



Transportation and settlement.—Settlement began in the Red River Valley through the efforts of Lord Selkirk in 1812. It was not until after 1896 that the move to the Canadian West got under way, however. Transportation and a stable government have paved the way, and the prairies have come into their own. Today, the estimated population of the prairie provinces is over 2,500,000. This is an amazing record of man's adaptation to a new environment.

Advantage was taken of the fact that the rivers run eastwards across the plains. The rail lines followed the river valleys to some extent as they diverged from Winnipeg. In this way it was not necessary to bridge the rivers time and again. Line after line has been built parallel to the main line of the C.P.R. and of the C.N.R.

North-south lines are few in number, the two important ones being Regina to Prince Albert, and Calgary to Edmonton. During the years since 1900, the building of new railway lines has never ceased, until there are now 19,218 miles in operation within the three provinces. To a very large degree the development of the prairies as a great grain-growing district has been dependent upon adequate transportation facilities.

The climate and the wheat-growing industry.—Wheat is the chief cereal grown on the prairies, which are particularly well adapted for large scale production. Great areas or long fields can be ploughed with few turns by the machinery. This saves time and reduces production costs. There is little clearing to be done: almost everywhere the land lies ready for the plough. Hard wheat, the most prized of the wheat family, because of its high gluten content, is a most fastidious plant. Three factors are necessary for its proper development: rich soil, rain at the right time, and the proper range of temperature. The first is evident in the heavy growth of natural grasses which cover the land and from which natural hay is cut.

The frozen, snow-covered soil of the prairies is a determinant of the hard-wheat belt. The soil is not leached by winter rains, and retains valuable soil acids which would otherwise be washed away. The winter snowfall, although quite moderate in amount, lies late in the spring, and as it melts, provides moisture for the soil. The frost coming out of the ground in the spring still further nurtures the sprouting wheat, which has been planted as soon as the surface has thawed out. The wheat stools out, that is, each grain sends out eight or ten side shoots, each of which will bear a head of wheat. The roots go down deeper as the frost leaves the soil, and find food and nourishment which the ripping and tearing of the frost has helped to provide.

Then come the lengthening days of May and June, the long hours of sunlight with increasing heat. The wheat grows rapidly. The summer rains come when they are needed. Without these the wheat would send up a weak stalk with a small head. The rains gradually cease during July and the heat reaches its maximum. In August the lessening days and the cool nights ripen the wheat, and the heads stand up strong, well-filled, and ready to be cut. If the rains continued the wheat would not ripen, but would continue to grow and remain soft until frost nipped it. In this nice adjustment and balance of nature lies the final secret of the fertility of the hard-wheat belt of Canada.

But nature is not always so bountiful to the prairie farmer. Drought conditions during the 1930's reduced production considerably, particularly in Saskatchewan. Wind erosion carried away many tons of good top soil. The Canadian Government set up a special committee to study the problem as thousands of farmers were forced from the land by these adverse conditions. Their recommendations included strip farming, tree planting, and irrigation. Farmers were advised not to burn the stubble from their fields but to plough it under to conserve the fibre content of the soil. Plans for irrigation projects were drawn up and are now being carried through. Many millions of acres will be brought under cultivation, and, in these areas, it is hoped that water will be assured, even though the rainfall drops below its annual average.

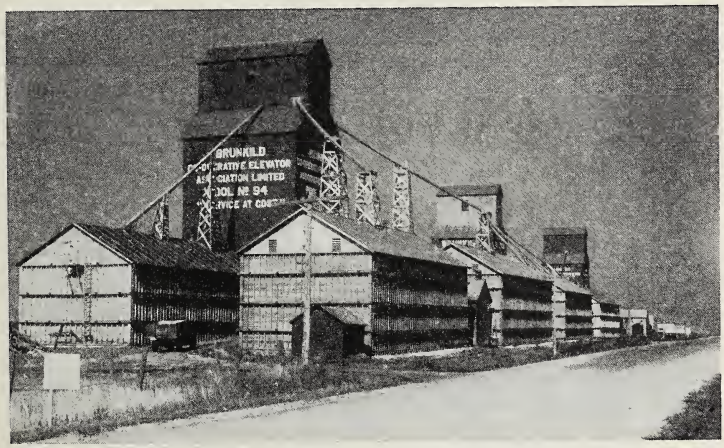
Development of Canadian Wheat.—The first prairie farmers used Red Fife wheat, which often would not mature before the first hard frosts of August. Dr. Charles E. Saunders, the Dominion cerealist, produced the celebrated 'Marquis' type of wheat upon which Canada has built an unsurpassed reputation. The new wheat would ripen from four to ten days earlier than the Red Fife; it produced a heavier yield, and made an excellent flour. By 1926, the bulk of the Canadian wheat crop was of the Marquis variety. Dr. Saunders has given us an earlier maturing wheat thus saving thousands of acres of late seeding from frost damage. Our wheat growing area has thus been extended northwards by many millions of acres. During the past few years, two new varieties of early maturing wheat, Garnet and Reward, have been developed. Other varieties, such as Thatcher, are also grown.

In 1915, the wheat acreage in Canada was some 18 million acres — producing nearly 400 million bushels. Acreage continued to expand and by 1938 over 28,726,000 acres were seeded to wheat in Canada. Net world exports of wheat and wheat flour in the five years 1922-27 rose to 777 million bushels annually. The all-time record of 946 million bushels was reached during the crop year 1928-29. In 1941, during the second World War, the Canadian Government encouraged a reduction in wheat production because of the world demand for live-stock and live-stock products. Over 7 million acres less were planted in wheat and until 1944, wheat acreage continued to decline. As the live-stock population increased, there was found to be an insufficient amount of feed grain. The use of wheat for animal feed increased to a record level of more than a million bushels. Figures show that in

1944 a total of 570 million bushels of wheat was fed to animals and poultry in North America.

During the war years Canada's exports of wheat increased nearly 35% over the five year period before the war.

Production Methods.—In order to maintain a high living standard, the prairie grain farmer must utilize machinery to the greatest possible degree. The flat prairie land adapts itself readily to this. Tractors and trucks have replaced the horse for ploughing and hauling, and whenever possible the combine is used in harvesting. Disease and insect pests are kept under control by dusting from aeroplanes. In many cases the individual farmer cannot afford the expensive equipment but, by pooling resources with other farmers, or by forming a farmer co-operative, it is possible for the owner of a comparatively small holding to avail himself of such modern machinery.



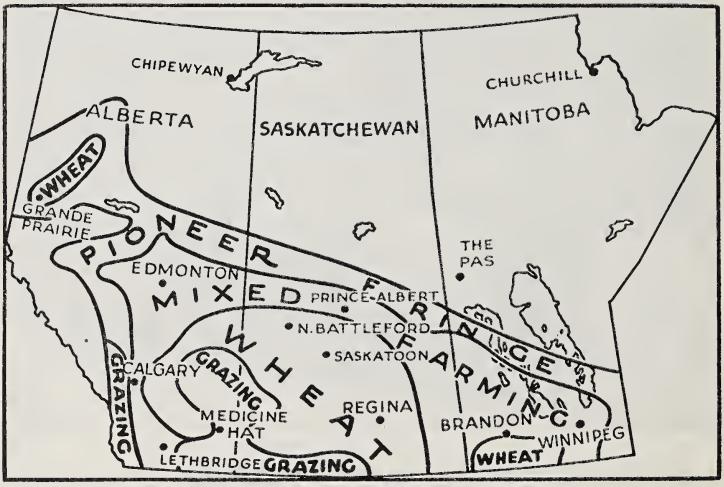
Courtesy Dept. of Mines and Natural Resources, Man.

The grain elevators which stand as sentinels across the wheat lands of Manitoba are a typical Western Canadian method of handling grain. Since the second World War, storage facilities have been unable to take care of the large grain crop and extra storage bins may now be seen beside nearly every elevator.

Marketing the wheat.—After the wheat has been threshed, it is hauled by the farmer to the nearest elevator. As the small railway stations at which the elevators are built are only nine to ten miles apart, the farmer does not have a long haul from his farm. The wheat is weighed and graded as it is delivered by the grower and is placed in bins. When it is to be shipped, railway cars are moved under the elevator spouts and are quickly filled. The elevator

weighs, stores and loads the farmer's wheat, and the railways carry it away to market. Many thousand railway cars are needed each year to move the 400,000,000 bushels of wheat which the prairies now produce, and the autumn of the year is a busy time for the railways. Some of the wheat is exported through Vancouver, the rest goes east to Winnipeg and Fort William, and thence by lake and rail to either Buffalo or Montreal. The description of the lake route will be found in Chapter 9, page 119, if you wish to follow the wheat to its destination at this time.

Other grains.—Wheat is not the only grain that the farmer grows. Oats are used for feeding cattle and horses; barley is fed to pigs and is also used in brewing beer; rye is ground into flour. Flaxseed is crushed, the oil extracted, and the residue made into cakes and fed to farm animals. Linseed oil is used in making paint.



Stock-raising and dairying.—If the land is cropped for grain year after year, there comes a time when even the richest soil becomes poor, and the yield grows less and less. In order to overcome this difficulty farmers are undertaking more and more dairying and stock-raising. When cows are kept on the farm there is a supply of manure to spread on the land. Some of the land is kept in pasture. It is profitable to grow potatoes, and to raise corn and sunflowers for ensilage. This leads to a rotation of crops, frequent manurings, and ploughing under of the grass. The result is an

increase in the yield of grain, and a satisfactory profit from the sale of milk, cream, butter, and calves.

These provinces raise about one-half of the horses and cattle in Canada, and about one-third of the milk cows and swine, and over one-third of the poultry. They produce about one-third of the butter and some seven million pounds of cheese.

There is little doubt that the prosperity of the prairie farmer is determined by the degree to which he has expanded his mixed farming and has not depended entirely on wheat as a source of income.

Mining.—The Prairies are fortunate in the possession of vast coal areas along the base of the Rockies in Alberta. Unfortunately the beds are located far from the present centres of industrialization of the eastern provinces, and the output at present is limited to some nine or ten million tons a year. It has been estimated that the probable and possible coal reserves of the Prairie Provinces is about 72,000,000,000 tons, one of the greatest known coal reserves in the world. Canada will do well to consider the vast potential power that awaits development here. In 1945 Canada imported over 24.5 million tons from the United States and 28,000 tons from the U.K. In the near future perhaps our manufacturers will consider the possibilities that exist in the Western coal fields and do more to encourage their development.

Nearly one quarter of the mineral wealth of Canada came from the resources of the Prairie Provinces in 1946. Ninety miles north of The Pas, the famous Flin Flon Mines, which straddle the Saskatchewan-Manitoba boundary, produce gold, silver, copper and zinc.

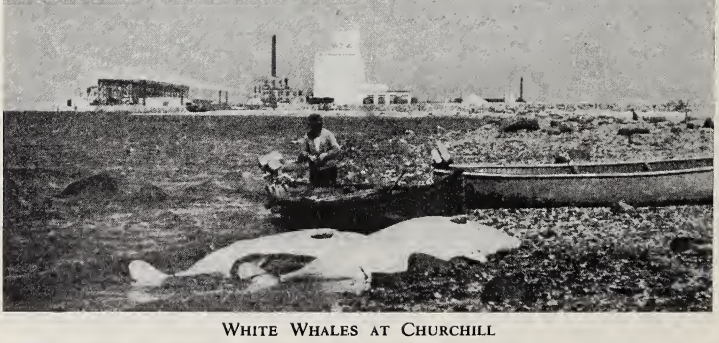
Oil and Natural Gas.—Canada now ranks third in the British Commonwealth in the production of petroleum, thanks to the oil fields of Alberta, which supply all but a small part of Canada's 21 million barrels. For years Turner Valley provided by far the greater part of this oil production, but the Leduc-Woodbend field, discovered in 1947, and further developed in 1948, made possible the new high production figure for that year. Then the discovery of the Redwater field in 1948 and its development in 1949 has brought production to an all time high. It is now estimated that within a decade Canadian consumption will approximate 150 million barrels of oil. Present exploration work is meeting with such success that it is quite probable that this demand will be met by Canadian oil reserves. Already a pipeline to the Great Lakes is in use and Alberta oil is replacing some of the United States supply formerly sold in eastern Canadian markets.

Natural gas wells have long supplied Medicine Hat, Edmonton and Calgary with power to run factories and mills and to heat the homes of the people. About 60,000,000 cubic feet are produced in Alberta, and in some ways this has hindered the development in hydro-electric power. Construction of a natural gas pipeline to the Pacific coast should soon be under way.

Fur trading is actively carried on throughout the northern section of the Prairie Provinces. Edmonton is an important fur market. Each year fur sales are held at Edmonton and at Winnipeg, where the lowly muskrat leads in total value of all the kinds of furs offered for sale. A large section of the Canadian Shield will always remain a great fur farm. It is covered with the dark spruce forest which stretches eastward to Labrador. It is dotted with thousands of lakes, both large and small, and it is a maze of interweaving waterways. It is one of the finest fur lands in the world, the climate being sufficiently cold to produce thick, glossy peltries.

Fisheries.—The lakes of Manitoba, and of the northern Saskatchewan and Alberta, are noted for the number and quality of their fish. Pickerel, pike and trout are caught for local use. The whitefish is the more valuable lake fish and is caught in large quantities, by means of nets placed beneath the ice. They are easily frozen, and are shipped in that condition. The prairie winter provides a free cold-storage house, such as is not available for the coast fisheries of either British Columbia or Nova Scotia.

Churchill (2,200) is located at the mouth of the Churchill River and is the terminus of the Hudson Bay Railway, completed in



White Whales at Churchill

Note the grain elevators in the background and also the outboard motors on the light boats.

1929. Although Churchill is almost midway in the continent, its higher latitude places it closer to the British Isles than the chief seaports of the United States. New York to Liverpool is 3,036 miles, Churchill to Liverpool is 2,960 miles. A part of the prairies is, therefore, brought within a 500-mile rail haul of tide-water. The original fur trading settlement migrated from the west to the east bank of the river during the early 1930's when the seaport, with a 2,500,000 bushel elevator, was built. Churchill now has several functions: it is still a fur trading centre and Indian settlement; it is a transhipment point for export grain (in 1951, 21 ships loaded a total of 7,5000,000 bushels); and it is a defence centre and gateway for Arctic Canada.

Manufacturing.—The industries of the Prairie Provinces are based on the agricultural resources, namely, grain, cattle and dairying. Over 80% of the manufacturing is confined to a few urban centres, such as Winnipeg, Regina, Calgary and Edmonton.

Slaughtering and meat packing has the largest gross value of production at present, followed by flour and feed mills, butter and cheese, petroleum products, and railway rolling stock. About 60% of the total production of these three provinces is accounted for by these five industries.

ALBERTA

Southern Alberta.—In the grassland belt in the southern part of the Prairie Provinces irrigation is necessary in order to ensure a crop of grain. In its natural state the prairie is covered with a short native grass. It is a good range land but not a safe grain growing sector. It was a mistake to cut up the original grazing leases and permit homesteading for the purpose of growing grain. The drought of the years 1930-3 has proved this point conclusively. The dry-belt portion extends north to the vicinity of the Bow and Red Deer valleys. Between Calgary and the border over one million acres of land have been made available for settlement; over 4,000 miles of canals and laterals bring water from the Bow, Belly, Oldman and St. Mary Rivers to thirteen irrigation projects. The St. Mary River System, which irrigates an area of approximately 500,000 acres, is the most important irrigation project ever undertaken in Canada. Water for this system is drawn from the Waterton, Belly, and St. Mary Rivers.

Wheat, oats, barley, rye, flax, alfalfa, hay, potatoes and sugar beets are produced. With Lethbridge as the centre, the area around

Raymond and Picture Butte, which comprises 30,000 acres, produces 350,000 tons of sugar beets each year.

This is only the beginning, and it is fair to presume that, when all irrigation areas are occupied, the production will increase at least tenfold. Canada still offers many opportunities for the homeseeker.

Central Alberta includes the northern part of the true prairie country and the parkland district extending some distance north of Edmonton. On the west, the foothills of the Rockies encroach on the plains and present a rugged appearance. Alberta is more elevated and shows more relief than the other prairie plains and is sometimes called 'the foothills' province. The most outstanding features of the plain are the deep valleys in which flow the main tributaries of the Saskatchewan River system. Along the Red Deer River, bad lands have developed and exposed fosil beds and coal seams. It is a ranching country, much of it well adapted for the raising of Alberta's one million sheep.

Central Alberta is a fertile grain growing region. The high quality of the wheat has been recognized by winning the world's highest standing at international competitions at Chicago. In 1947, S. J. Allsop of Red Deer won the title of 'Wheat King' of North America with his sample of 'Reward' wheat. Alberta supplies nearly a quarter of the wheat production of the Dominion each year, besides 75,000,000 bushels of oats, 52,000,000 bushels of barley, 4,250,000 bushels of rye, and 2,150,000 bushels of flax seed. As only one-fifth of the agricultural area of Alberta is at present in use, it is apparent that the future will see still greater production.

Throughout the parkland district there are many sloughs and small lakes, and mixed farming is important. Dairy herds are being enlarged as the demand for butter and cheese increases. Nearly 50 million pounds of butter, 4 million pounds of cheese, and a million cans of condensed milk are derived from Alberta's farms each year. Hog raising has developed to the point where Alberta has twice led the Dominion in total hog production for any one province. The poultry industry has not been overlooked, and Alberta's two egg-drying plants have a total capacity for drying nearly half a million dozen eggs per day. Thousands of turkeys are raised, being fed on the poorer grains. These birds are shipped frozen to the Pacific Coast district for the Christmas trade. Meatpacking plants at Calgary and Edmonton process large quantities of beef, mutton, and pork.

Northern Alberta is a forested region with many lakes and streams, a part of the great coniferous forest belt of Northern Canada. Spruce, larch, birch, and poplar are the principal trees. Today, these stands of timber are estimated to contain nearly 30 billion cubic feet of saw and pulp material, and forestry and saw-mill production now is over 275 million board feet yearly. These forests provide the home for the wild animal life which has made this section the fur country of Alberta. Since the days of the early explorers this northern section has been exceedingly rich in furs. Muskrat, fox, marten, weasel, beaver and lynx are trapped. Fur farming is growing in importance in other parts of the province and some 1,200 establishments produce 4 million pelts, making Alberta one of the leading fur provinces of Canada.

This area of over 100,000 sq. miles, with a population of less than 10,000, has possibilities for greater development of the fishing and lumbering industries, and the oil and salt mines, which will prove useful to a world in need of natural resources.

At McMurray, along the Athabasca River are the famed oil-soaked tar sands. Underlying the area of Waterways and McMurray are large deposits of fine grade salt. These deposits and others in the province are estimated to hold 30 million tons—enough to meet Canada's needs for sixty years. In 1944 the production was over 25,000 tons.

The Peace River District, 400 miles north of Edmonton, has an area of 33,845 sq. miles with a population of only 47,833. This area will be described in the section on British Columbia. The area has unlimited possibilities, and while noted for its prize wheat, oats, and barley, its development has hardly begun. Rich in natural resources of coal, petroleum, forests and clay, it awaits settlement.

Coal.—The coal deposits of Alberta are estimated as 46 billion tons. Outcroppings occur in nearly every part of the province, but mines of highest grade coal lie east of Banff, in the southern Sheep Creek district, and in the northern Smoky River area. In the foothills district mines extend from Lethbridge to Edson and at Drumheller, east of Calgary. About 8 million tons are mined annually. But the distance which the coal must be hauled by rail adds to its cost, and this has kept production figures down. As Alberta increases its industries and uses its coal as a raw material for the manufacture of hundreds of products, the coal industry will also develop.

Petroleum.—The extent of Alberta's oil reserves is as yet undetermined, but recent discoveries indicate that further exploration will prove substantial reserves. At this time millions of dollars are being spent on developing these reserves, and within the next ten years it is hoped that oil reserves sufficient to supply Canada's needs will have been proven. The reason for this optimism is that there are hundreds of thousands of square miles of sedimentary deposits of the type in which petroleum has been found in other areas. These formations stretch from the Rockies east to Manitoba and north to the Arctic Sea. Seismograph surveys take much of



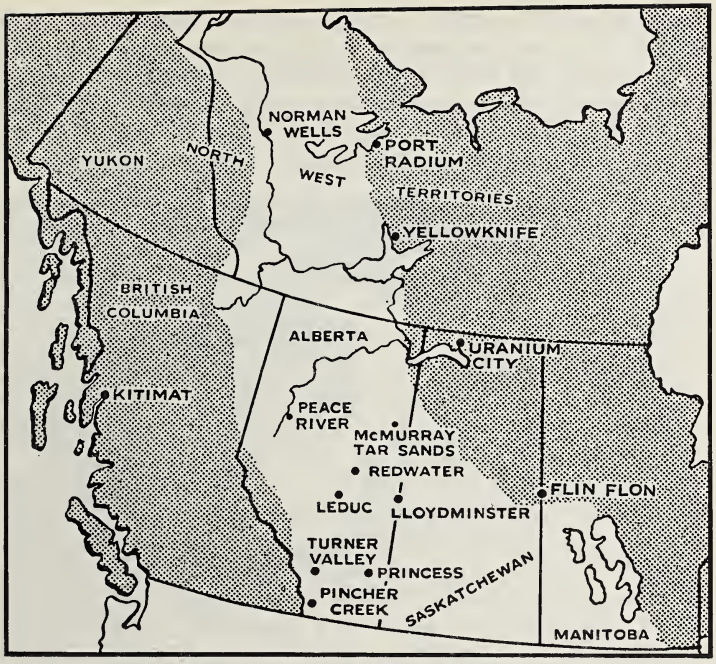
Courtesy Imperial Oil Limited

This is not a 'gusher' which means a well that is out of control. Today a gusher is a rare accident, for petroleum is much too valuable to waste. This photograph shows a well soon after its birth, when oil coming up the hole is mixed with mud, water, and chemicals used in drilling. As the well 'clears its throat', the mixture, contaminated and useless, is burned for a few minutes before the well begins to produce clean oil.

the gamble out of 'wildcatting', and these surveys have been very satisfactory in Alberta.

At the present time the greater part of the oil is being produced in three major fields, namely, Turner Valley, Leduc-Woodbend, and the Redwater field.

Turner Valley.—For many years this field was the principal source of production, the peak being reached in 1942 when, under the stimulus of war, over ten million barrels were produced. Since



THE SEDIMENTARY DEPOSITS OF WESTERN CANADA.

then production has declined, though geologists estimate that the field will produce at a diminishing rate for fifteen to twenty years.

Leduc-Woodbend.—Leduc, south of Edmonton, was brought into production early in 1947, and a year later was extended to include the nearby Woodbend field. There are now over 350 producing wells in the Leduc-Woodbend field and recoverable reserves are estimated to exceed 250 million barrels. The daily output at the end of 1949 was about 24,500 barrels.

Redwater.—In October of 1948 the Redwater field, north of Edmonton, was discovered. A year later, with limits in all directions still undetermined, proven reserves were estimated at 360 million barrels. By the end of 1949 there were 240 producing wells in the field. As the oil is being recovered from between 3000 feet and 4000 feet, the cost of drilling in the Redwater field is much less than in the Turner Valley, where many wells were over 6000 feet in depth.

Lloydminister.—Besides the three major fields, oil has been produced for over ten years in the Lloydminster area. The wells in this region are small but the number is steadily increasing. Production reached its peak in 1948 with 1,500,000 barrels. Since then it has declined, not because of failure of the wells, but because of lack of refinery capacity and marketing difficulties.



Courtesy James Richardson & Sons.

Lesser Fields.—Though the greatest activity during recent months has centered around the productive Edmonton area, there are several lesser oil fields developed in Alberta. These are: the Princess Bantry, 100 miles east of Calgary; the Taber Conrad, 36 miles east of Lethbridge; the Vermillion-Wainwright, west of Lloydminster; the Pincher Creek area, directly south of Calgary.

Recent discoveries.—Besides the huge sums being spent on developing wells in proven areas, a considerable amount of wildcatting is being undertaken and many successful wells are being found. The biggest strike in 1949 was made fourteen miles south-

west of Edmonton, when the Golden Spike well was brought in. This well has proved to be Canada's greatest well, with a potential flow of 12,000 barrels per day. Though the field appears small in area, the depth of the 'pay-zone' is great, and this field should yield a substantial quantity of oil.

Other successful wells have been drilled in the Normandville field, 250 miles north of Edmonton; the Excelsior field, 12 miles north of Edmonton; the Bon Accord field, 18 miles north of Edmonton; in the Stettler field, 7 miles south-west of Stettler; at Joseph Lake, 22 miles east of Leduc; at Campbell, eight miles north-west of Edmonton.

Further development will prove the extent of these fields, and though fields as extensive as Leduc-Woodbend or Redwater are not expected, considerable oil will be added to Alberta's total production.

Natural gas.—Natural gas is usually found along with medium and higher grade crude oil, and also alone in a dry form. Discoveries of natural gas in Western Canada have resulted from the search for oil, and, because of lack of markets, many wells have been capped. This is not the case in such fields as the Viking-Kinsella, Medicine Hat, and Pakowki Lakes regions, where the gas produced in these areas is marketed in nearby towns.

The extensive oil development programme of post-war years has proven great natural gas reserves which warrant the building of pipelines to make its use through the Prairie Provinces more extensive and to make possible its export to other Canadian provinces and to the United States. The Alberta Petroleum and Natural Gas Conservation Board is authorized to grant permission to export natural gas provided there are sufficient reserves to ensure both domestic and export supply. At the present time there are projects planned to build pipelines to Saskatchewan and Manitoba centres, and over the Rockies to supply British Columbia and the states of Washington and Oregon.

Natural gas is much in demand because of its convenience, its cleanliness, its ease of control, and its economy. This ideal fuel can be delivered hundreds of miles from its source at prices as low or lower than those paid for competitive fuels.

The geological conditions in the Prairie Provinces are similar to those of natural gas areas in the United States, and the reserves should be as great. The extent of the discoveries in Western Canada are not yet known with any degree of accuracy, though conservative estimates place these at about 4,000 billion cubic feet.

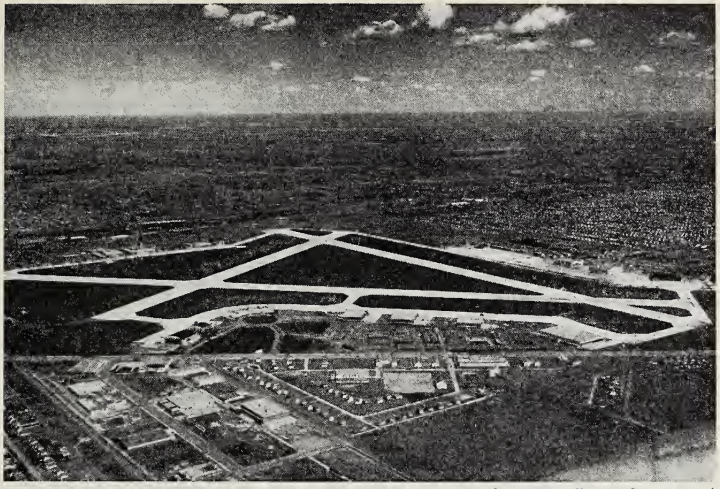
The following are some of the most productive fields: Viking-Kinsella, Medicine Hat-Redcliff, Turner Valley, Pendant d'Oreille, Jumping Pound, Leduc-Woodbend, and Princess. Many more areas are known to contain gas in volume, but have not been developed sufficiently to make any estimate of their gas reserves.

Natural gas wells are now producing over 57 million cubic feet annually and many industries depend on this important fuel for power.

The Alberta Petroleum and Natural Gas Conservation Board has done much to ensure production methods that will make possible the maximum recovery of both gas and oil from each well. The number of cubic feet of gas produced with each barrel of oil is known as the gas/oil ratio which, along with other factors, determines how much oil per day each well may produce. Such regulations will prolong the life of each field and ensure the highest possible recovery of oil and gas. Before such measures were adopted, there was a great waste of natural gas which was flared or burned. Though this practice is still continued where it is uneconomical to store the gas for market, the greater part of the gas is now saved and either stored or marketed.

The possession of coal, oil, and natural gas, well distributed throughout Alberta, is a most valuable resource in a province over 600 miles from tide-water and with a cold winter climate. It has stimulated manufacturing and is a boon to the dairying, meat packing, and milling industries. The wise policies of the government of Alberta in regard to the sale of mineral rights and royalties received, has placed the province in a sound financial position and it is able to insist on practices designed to conserve these valuable resources.

Edmonton is the large trading centre of central Alberta and the capital of the Province. In 1951, it had a population of 173,000. It is situated on the high bank of the North Saskatchewan River where it is crossed by the main line of the C.N.R. Four rail lines extend into the northern districts, one to Waterways, another to Peace River. The main C.N.R. line runs west through Yellowhead Pass to Vancouver and Prince Rupert. Five lines extend east and south from Edmonton, and the city is a distributing centre for the whole of Northern Alberta and for a large part of Central Alberta. During the second World War, Edmonton's central position 'in a global world' made it one of the great air-freight shipping points in the world. From its large airstrips flew the planes of the allied nations to the aid of Russia and the protection of our northern borders.



Courtesy Alberta Government

THE AIRFIELD AT EDMONTON, ALBERTA.

In an 'air age', Canada's northern territories are in the middle of the world, not on top of the world as we often believe. A study of a global map will show Edmonton's unrivalled position on the north-western route to Alaska and to Asia.

Besides being the seat of government and the home of the University of Alberta, Edmonton is the location of the following industries: meatpacking, flour milling, fur trading and oil refining. There are also car repair shops, sawmills, creameries and cheese factories.

Calgary (139,000) second largest city in the province, is situated on the main line of the C.P.R. at the junction of the Elbow and Bow rivers. For many years—in fact, until the completion of the C.N.R.—Calgary enjoyed a monopoly of Alberta trade. A branch line ran north to Edmonton and another line ran south to Lethbridge. Calgary has natural gas, cheap coal, and a hydro power-station on the Bow River. The development of the Turner valley oil field has been of considerable advantage to the city, which now has a large refinery. The irrigation projects in the Bow valley and southward have added to Calgary's importance. Industries of note are: meat-packing, flour-milling, and the repair and distribution of all kinds of machinery.

Medicine Hat (16,400) on the south Saskatchewan is a railway and manufacturing centre for the eastern part of the province.

Cheap power from natural gas-wells has been the chief factor in the development of the city. It is noted for its flour mills and pottery and brick works.

Lethbridge is the third of Alberta's gateway cities. It is situated at the edge of the foothills and controls the trade which comes through the Crow's Nest Pass. Coal is mined throughout the valley of the Old Man River and eastward as far as Taber. The irrigated lands in the vicinity make the district a very productive one. To the south Raymond is the centre of the sugar-beet fields, and has a large sugar refinery. The beet pulp is fed to cattle and pigs and is a help in the livestock industry of this district.

Water Power.—Alberta's potential water power is estimated at just over one million horse power. Nearly 100,000 horse power, or one-tenth of this power, is at present developed. The quantities of good coal, natural gas and petroleum, and the fact that the potential water power is situated at some distance from the large centres of population, have hindered the development of hydro-electric power, but plans are now underway to harness these resources. The completion of the development at Spray Lakes, in the upper Bow River basin, will add approximately 65,000 horse power to Alberta's total of developed power.

Fishing.—Over seven and a half million pounds of fish are caught in Alberta's lakes and rivers. Whitefish, trout, pike, pickerel, perch and tullibee supply the home market; however over half of the yearly catch is exported to eastern United States cities as far away as New York.

SASKATCHEWAN

The central province of the prairie region has a larger area of land under cultivation, and a larger area available for the plough, than either of its neighbours. Nearly 24 million acres are devoted to field crops, and the province's 832,688 people now claim the second highest value of farm capital in Canada.

Saskatchewan is the wheat province of the Canadian west. With over 14.8 million acres seeded, this province alone produces about one-half of the total Canadian wheat crop. Other grains are produced in quantity as well, such as oats, barley, and rye.

The dry-belt conditions of southern Alberta continue on through the south-western portion of the province, which is a stock-raising district. However, the same mistake was made in this district that was made in southern Alberta. Stock-grazing leases were retired

and the land opened for settlement. A few years of good rainfall gave abundant crops. Then came the drought of 1930-33. The wind blew the dry, powdered soil into drifts, the wells went dry, and it became necessary for the Government to assist thousands of farmers to move into central and northern Saskatchewan where a larger amount of precipitation ensures a crop. It will take a long time for the dry-belt prairie to regain its cover of native or other grasses. Once these have become established the marginal lands should be permanently retained as range land and offered under grazing lease to the stockmen.

The map on page 156, showing the main types of farming in the Prairie Provinces, indicates the areas now devoted to live-stock, etc.

During the past few years, there has been a notable increase in the production of other farm products besides grain crops from Saskatchewan farms. The poultry industry has developed to be the second largest in Canada, with a total egg production of some 60 million dozen. One-third of Canada's turkeys are raised on Saskatchewan farms. Butter, cheese and honey are also produced in large quantities.

Saskatchewan felt the effects of the economic depression of the 1930's more than any other province. For this reason, the Saskatchewan farmer, realizing that the individual in a modern economic society such as ours is very much dependent upon the welfare of that society as a whole, turned to co-operative farming as a means of improving his lot. There are at present thirty-two co-operative farms in Saskatchewan, and many other groups are studying ways and means of farming co-operatively. Thus the individual may gain the advantage of modern scientific farming through working with a group, whereas, as an individual, he would lack the necessary capital to change his method of farming or to purchase necessary expensive equipment.

Central Saskatchewan merges into the coniferous forest belt as in Alberta. A little north of the line between Battleford and Prince Albert, the park lands give way to forest. There is a small lumbering industry in this area. Numerous lakes provide whitefish and trout. The total value of the catch amounts to over a million dollars annually. The fur trade is also important and Prince Albert is the centre.

Mining.—Of the extractive industries, mining ranks second in importance in Saskatchewan. The Flin Flon mine, producing copper and zinc, provides the major portion of the province's mineral output. Though the portal of the mine is in Manitoba,

83% of the ore mined in 1947 came from the Saskatchewan side of the border. Interest in the goldfields area on Lake Athabaska is centred in pitchblende ore. At Estevan, near the Dakota border, lignite coal has been mined for some time. Oil and natural gas are produced in the Lloydminster area and give promise of further expansion. The success met with by oil exploration companies in Alberta is stimulating a similar search in Saskatchewan, and there is good reason to believe that the production of these two important products will greatly increase.

The central prairie is deficient in fuel and power. For this reason there is little manufacturing and no city as large as Edmonton or Calgary. There are no gateways through a mountain range to force traffic along a well-defined channel, and no lakes to force traffic through a funnel as at Winnipeg. There are, however, important, though smaller cities.

Regina, (70,000) is the capital and largest city of the province. It was chosen as the capital in 1905, and was at that time the headquarters of the R.N.W.M.P. and centrally located for the development of the prairie lands. A branch line then ran north to Prince Albert and another south-east to Arcola.

Today, Regina is the centre of C.P.R. and C.N.R. lines radiating in all directions.

There are now over 100 industries in Regina which include wire and steel works, foundries, machine shops, abattoirs and meat packing plants, cement, artificial stone, and clay products, paint, varnish and glass plants. Two oil refineries and an automobile assembly plant are situated here. The town is the distributing centre for the Middle West and is the headquarters of Saskatchewan's wheat, dairy, and poultry pools.

Moose Jaw, forty miles to the west of Regina, is in the centre of a rich mixed farming district and is a main divisional point on the C.P.R. and C.N.R. systems. The town has large stockyards, flour mills, a meat packing plant, lumber companies, and oil refineries. Deposits of coal and sodium sulphite are found in the surrounding region.

Saskatoon is the point where the rail lines cross the south Saskatchewan River. In 1905 the population of the city was less than 600. It is centrally located and was chosen as the proper site for the provincial university. Saskatoon is a supply centre for a fertile wheat-growing area and a number of large storage elevators. Battleford and Prince Albert are the larger centres along the northern edge of the grain belt.

MANITOBA

Manitoba has an area of 246,512 square miles of which 26,789 square miles is water. The southern part of the province is drained by the Red and the Assiniboine Rivers which flow into Lake Winnipeg, which in turn, is drained by the Nelson River into Hudson Bay. The surface south of the lake system is flat, though broken by many valleys and some hills. The northern and eastern sections of the province lie within the Canadian Shield and slope towards Hudson Bay.

Agriculture.—Manitoba has 52,000 farms with an area of 18,000,000 acres, and of this, about one half is at present under cultivation. Of Manitoba's farm income, field crops provide the greater part, wheat being the leading product. Oats and barley are also grain crops of importance. In the 1930's, this province did not suffer from drought as did Alberta and Saskatchewan. The average annual rainfall is over 20 inches in the southern part.

The Manitoba farmer has been long established and is now turning to diversified farming to a greater extent. Sugar-beets grow well in the Red River Valley and are processed at the plant of the Manitoba Sugar Company near Winnipeg. Vegetables produced on the fertile soils of the river valleys, sunflower seeds for edible oils, and honey are important sources of revenue.

Second in importance to grain growing, stock raising and dairying provide a large part of Manitoba's income, and are the basis for two of the largest manufacturing industries.

There are over 700 fur farms operating in the province and Manitoba has the second largest fur market in Canada. The Government operates the largest muskrat ranch — an area of one million acres — in central Manitoba. Trapping has been aided by modern conservation methods, and, in recent years, there has been an increase in fur bearing animals.

Mining.—Considerable mineral wealth is contained in that portion of the Precambrian Shield that lies within the province. Because of transportation difficulties only the large ore deposits have been developed.

At Flin Flon, the Hudson Bay Mining and Smelting Company operates one of the most important base metal mines on the continent, producing chiefly zinc and copper.

The Sherritt-Gordon Mine at Sherridon produced base metals and some gold. One hundred and twenty miles north of Sherridon in the Lynn Lake area, rich deposits of copper and nickel have been found; a railway and a town are now being built here. Extens-

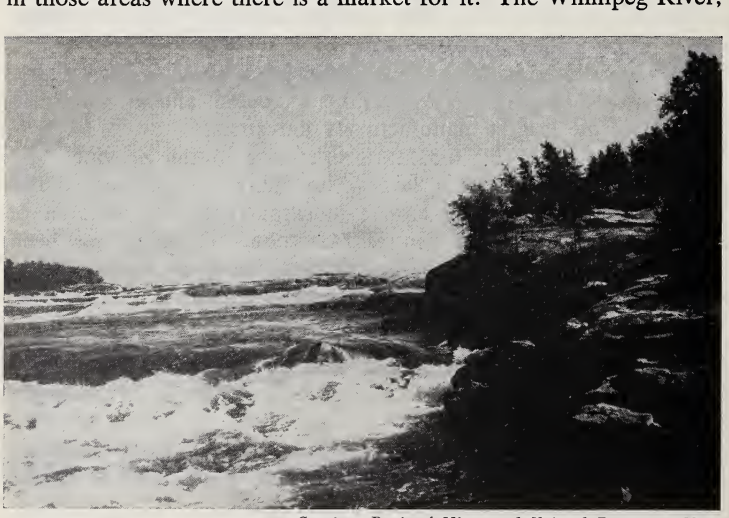
ive gold discoveries in the northern part of the province have been examined and will be developed if production costs and the price of gold are brought into line.

Almost equally valuable are some of the non-metallic mineral products. At Fort Whyte, a cement plant is in operation. Stone quarries near Garson turn out a particularly fine tapestry building stone which is popular throughout Canada. Deposits of bentonite, used in refining oils, have been developed.

Fishing.—The extensive lake area has made fishing an important industry, and Manitoba ranks second to Ontario in the production of fresh water fish. Whitefish and the famed Lake Winnipeg Goldeye are the chief varieties. Over 7,000 people are engaged in the industry.

Lumbering.—Over 40% of the land area of Manitoba is forested, though only one-third of this area is productive. The tree species include both hard and soft woods. There are 200 lumber mills in the province. A paper mill is located at Pine Falls and produces 100,000 tons of newsprint annually.

Water power.—Manitoba is developing her water power resources in those areas where there is a market for it. The Winnipeg River,



Courtesy Dept. of Mines and Natural Resrouces, Man.

SILVER FALLS

Situated on the Winnipeg River, is an example of Manitoba's abundant water power resources. Note the forested rocky country typical of Northern Manitoba and Saskatchewan.

at Pointe du Bois, Slave Falls, Seven Sisters, Great Falls, and Pine Falls, has been harnessed, not only for Winnipeg, but also for a large section of the province.

The Manitoba Power Commission is engaged in a ten year programme to bring electricity to 90 percent of the farms. Great water power resources exist in the Shield areas of the north along the Churchill and Nelson Rivers, but so far remain undeveloped.

Manufacturing.—Industrial expansion is based largely on agricultural industries. Flour mills, packing houses, creameries, sugar refineries, and canneries process the products of the farm. Stockyards at St. Boniface rank high amongst those on the continent. The production of building materials has already been mentioned. Cast iron and rolling mills produce iron and steel products for Manitoba, the Prairie Provinces and north-western Ontario.

Winnipeg, (354,000) the capital of the province, the largest city on the prairies, and one of the larger manufacturing centres of the Dominion, stands at the junction of the Red and the Assiniboine rivers. Its stockyards receive more cattle than any other Canadian city except Toronto, and through its railway yards passes a large



The corner of Portage and Main Street, Winnipeg, looking west on Portage Avenue. A focal point of the West.



Courtesy Mayor Garnet Coulter and Harold White Studio, Winnipeg

RED RIVER FLOOD, WINNIPEG. 1949.

part of the prairie wheat crop. Winnipeg has immediate access to few raw materials other than products of the farm, yet, with cheap electric power from the Winnipeg River and the prairies for a market, it has developed manufacturing to a point where the production of that industry exceeds in value the agricultural output of the province. The city is the focal point for the converging railway lines which are forced together by Lake Winnipeg on the one hand and the 49th parallel on the other. For this reason Winnipeg is the large warehouse and supply centre for the prairies. It is also the home of the provincial university.

St. Boniface across the river is inhabited by descendants of the Métis of fur-trading days. Large stockyards are located at this point. The city may be considered a part of Greater Winnipeg. Brandon, over a hundred miles west of Winnipeg, is situated in the heart of a rich farming district. Other towns serving local needs are Portage La Prairie, Dauphin, and Selkirk. The Pas is the southern terminus of the Hudson Bay Railway which links the interior region with Churchill on Hudson Bay.

Conservation in The Great Central Plain.—Nature imposes two great problems in our use of this region for agriculture. First, there is always the risk of not quite enough rain. Second, the way in

which we have used the soil has, for a good deal of the area, exposed it to erosion and robbed it of some of its fertility.

The people who first settled the area were accustomed to a fair amount of rain and had used quite different soils, mostly the grey-brown forest soils. They brought with them an idea about the proper size for a farm and tried to work the land in 160 acre blocks. It was soon found that, although the soil was fertile, there was not quite enough rain to grow sufficient crops on such a farm. Therefore there was a tendency for farms to be bigger.

Wheat has been the main crop on much of the prairies. Cultivating wheat has opened up the soil and removed its protective sod cover and the land has been eroded by wind. Even methods of 'dry farming' which are intended to make use of two years rain for one crop have made the soil susceptible to erosion. In some areas there has been overgrazing.

Various methods have been devised to protect the soil and make the most use of moisture. These include shelter belts of trees, farm ponds, controlled grazing, crop rotations which cover the land with soil-building and erosion-resisting crops, special methods of tillage to leave a protective cover of plant waste on the soil, and strip cultivation.

The farmers have adopted these methods and by so doing have insured the future prosperity of their land. They have been given help by government agencies, particularly the P.F.R.A. (Prairie Farm Rehabilitation Act).

EXERCISES

1. What is the importance or value to the people of western Canada of (*a*) the Red River? (*b*) the Winnipeg River? (*c*) the Fraser River?

2. Winnipeg is older than Vancouver City. Why is Vancouver larger? Victoria is a seaport. Why is Edmonton a larger city?

3. In what ways does Winnipeg act as a trading centre for the people of the great plains? What means of transportation is used by the people of the plains? Is a 'return cargo' ever sought?

4. If milk containing 4% butter-fat is worth 20c. a quart, what is the value of the butter fat in one pound of butter? (One gallon weighs ten pounds.)

5. When wheat sells for $1.50 a bushel, what is the cost of the wheat in a 16-oz. loaf of bread? (One bushel of wheat makes 52 loaves.)

6. If a farmer harvests 1,000 bushels of wheat and sells it to a milling company, how many loaves of bread may be made from the flour?

11

THE WESTERN CORDILLERA REGION

BRITISH COLUMBIA

British Columbia is one of the younger provinces of Canada; even its mountains are younger than those of eastern Canada. Wherever you go in British Columbia you will see evidences that the people are making a beginning, that they are laying the foundations of a great, rich province. The last ninety years have seen British Columbia pass from the status of a Hudson's Bay Company fur reserve to that of Canada's far western province and gateway to Oriental trade.

Although British Columbia lies between the 49th and 60th parallels of north latitude the maps shows that a portion of the northern coastline belongs to Alaska. The eastern boundary of the province follows the water parting of the Rockies as far as the intersection with the 120th meridian and thence along that line to the 60th parallel. The arrangement of the ranges of the Cordillera divides British Columbia into three well-defined areas:

(i) The Coast District lying west of the Coast Range.

(ii) The Interior Plateau lying between the Coast Range and the Rockies.

(iii) The Columbia Mountains.

(iv) The Peace River area lying east of the Rockies and continuing on into Alberta.

(i) The Coast District of British Columbia

The partially submerged coast of North America which stretches from the Juan de Fuca Strait to the Bering Sea is strikingly different from the bold and regular coastline which is found south of the Strait. Glacial action and the weight of an ice cap several thousand feet in thickness were, no doubt, the chief factors at work in producing the maze of islands, inlets, and canals which give distinction and commercial utility to the northern section. The coast of eastern Canada and the United States, from Labrador to the



Courtesy C.N.R.

C.N.R.'s 'Continental Limited' near Mt. Robson in the Canadian Rockies.

Hudson River, presents a similar appearance, although on a much smaller scale.

Vancouver Island and the Queen Charlotte group are the principal islands in size and commercial importance. Together with hundreds of smaller islands they form an almost unbroken screen to the waves of the Pacific, and provide hundreds of miles of protected waterways. Vancouver Island is about 270 miles in length, with an average width of 50 miles, and is slightly over 13,000 square miles in area. It is larger than Belgium and has twice the area of Wales. Mountain ranges run the length of the island, sloping steeply to the Pacific, but more gently to the eastern side. The lower slopes are heavily forested.

The Queen Charlottes lie off the mouth of the Skeena. The islands are mountainous with some hills, lowland, and muskeg east of Masset Inlet. The climate is mild, the rainfall is heavy, and the vegetation is dense. The trees grow to a tremendous size,

with tall, straight trunks. Spruce, red cedar, hemlock, and yellow cedar, or cypress, are the principal forest trees.

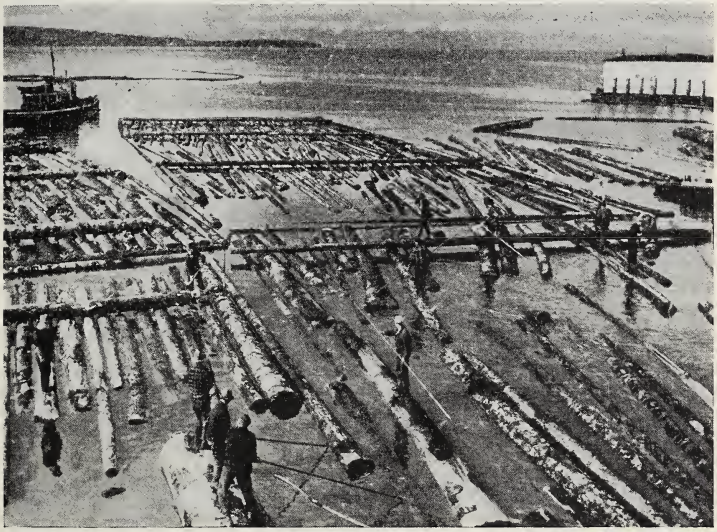
The Gulf of Georgia and Puget Sound.—When this part of the coast was depressed, the sea entered to form the Strait of Juan de Fuca and the large bays which extend behind the Olympic Mountains of Washington and the Vancouver Island Range. The smaller hills remain as islands, whose rounded summits and grooved rocks tell of glaciation. The Fraser, which pours a turbid flood into the eastern side of the Gulf of Georgia, is gradually building up a large flood plain. A few miles north of the Fraser mouth the high mountains of the Coast Range come down to the shore and plunge sharply beneath the water. The rugged, bold-faced mountains throw their heads high in the air and their feet as abruptly into the sea.

Inlets and canals.—One after another the tongues of the sea wind their way back into the heart of the range, where, in other times, huge glaciers scored gashes in the solid rock. Brawling streams foam down from the snow-capped peaks and pour their ice-cold waters into these inlets and canals, the fiords of British Columbia. At the head of the inlet a larger stream follows down the glacial groove and builds up a small meadow-land. As a rule the water of the inlet is deep, and nature has as yet done little in the way of filling it with sediment. From Burrard Inlet to Prince Rupert the mainland coast may be said to have little, if any, coastal plain. The same situation prevails from Sitka to Unalaska.

Forests and timber.—This region was covered, fifty years ago, with a dense coniferous forest. The heavy rainfall and the mild winter temperature of the Pacific coast of North America may be considered the two climatic factors which produced the great forests of this region. The forest extends from southern Alaska to the vicinity of Cape Mendocino, a distance of over 1,200 miles. In its original state it must have appeared an inexhaustible resource, but the last fifty years have seen a harvesting of the forest mantle on a scale never before attempted by man, and great as the Pacific coast forest may be, the end of the mature stand of timber is within a measurable future. The forest officials of British Columbia state that another twenty to twenty-five years will see the end of the big timber over those areas where it is profitable to conduct logging operations.

In the mild climate of this area the trees have grown to a diameter of six, eight, and ten feet, and from 150 to 200 feet tall.

Many of the larger trees are four hundred years old and are still growing. The forest is almost wholly an evergreen forest; over large sections there are no deciduous trees. Along the river banks, poplar, alder, and cottonwood may be found, but the primeval forest stands are noted for the towering height and the clean, columnar majesty of the conifers. Six trees of economic value may be noted: the Engleman spruce of the northern section; the Sitka spruce of the Coast Islands; the Douglas fir, the western red cedar, and the hemlock of the central section; the redwood of the California or southern section.



Courtesy C.N.R.

LUMBERING, B.C.

Compare the size of the logs with the lumbermen.

Of these the fir[1] is the most valuable. The wood is strong, hard, and has good lasting qualities. It is in demand for structural timber of all kinds, for bridges, trestles, wharves, warehouses, and sheds, wherever great strength is required in order to carry heavy loads. It is also used for edge grain flooring, interior trim, and outside weather-boarding.

The red cedar is easily recognized by the smooth bark and the drooping, feathery foliage. The wood is soft, straight-grained, and easily split. To the coast Indian the cedar tree meant house,

[1] Also called Oregon pine in the U.S.A.

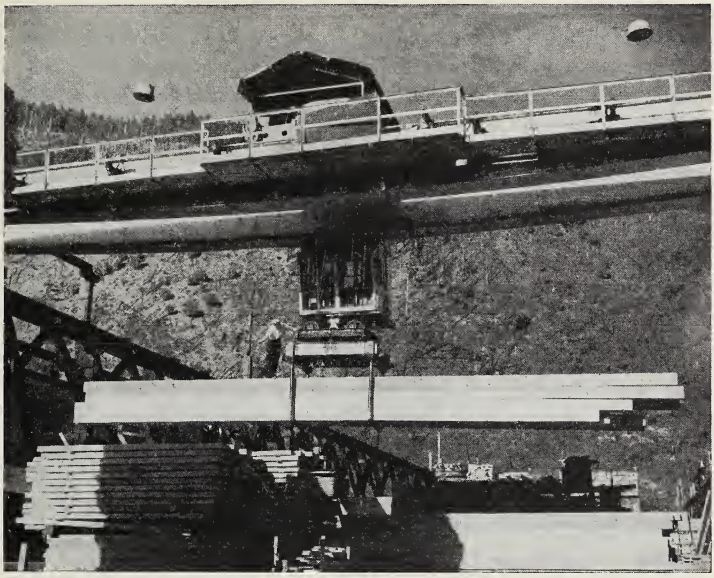
canoe, furniture, clothing, and rope. It had as many uses as the birch tree of eastern Canada. To the white man the cedar tree means shingles, and cedar shingles from the Pacific north-west cover the roofs of many of the homes in North America. Cedar is also used in the sash and door factories and for panellings.

The Sitka spruce is more limited in its habitat and grows to its largest size on the Queen Charlotte Islands. The wood is valuable for aeroplane construction. Being free from resin and odourless, it is used for kegs, firkins, and wooden-ware containers for such foods as butter, eggs, and fruit. It is also useful for pulpwood. The hemlock is the Cinderella of the forest. Its value is at present overshadowed by the fir and the cedar. The wood of the hemlock is strong and durable, but its greater weight is an adverse factor in shipment by log-boom or rail. The redwood grows on the Klamath plateau and in northern California. It is in demand for interior trim and in the construction of incubators. Heat and moisture have very little effect upon this remarkable wood.

Lumbering is the great industry of the Pacific coast. Nearly one half of British Columbia's wealth is derived from her forests. The long narrow inlets along the coast have made accessible the magnificent stands of timber, so that costs of getting logs to the water are low. The calm waters of the inside passage provide a comparatively safe route for the large flat booms. These are towed to the chief manufacturing centres in Vancouver and New Westminster. Many safe harbours along the coast favour the establishment of mills near the timber stands, thus minimizing transportation costs.

The size of the tree and the contour of the land determine the methods employed by the logger. Donkey engines, wire cables, power saws, railways, trucks, and tractors, are used to bring the logs to the water.

The high rate of cut is now endangering the province's timber reserves. When it is realized that the cut in a recent year exceeded four billion board feet, there is little wonder that the Provincial government passed an intensive forest management bill. By conservation, reforestation, and sustained-yield management plans, they hope to maintain the forest resources for the years to come. A competent forest fire prevention staff carries on a ceaseless campaign against fire and carelessness, which, during the past twenty years, have destroyed more timber on the Pacific Coast than lumbermen have shipped away. Forest Service nurseries are situated at Green Timbers, near New Westminster, and at Duncan



LUMBERING, B.C.
Note the heavy equipment used to handle the large timbers.

and Campbell River on Vancouver Island. These nurseries have planted some 60,000 acres of trees in the past twenty years. Large companies are co-operating in the reforestation plans and are trying to eliminate wasteful logging methods.

Forest Products.—The second most important industry in Canada which depends on the forest for raw materials, is the manufacture of sawn lumber. A study of the tables in the *Canada Year Book* will show British Columbia's share in this source of wealth for Canada. In 1947 the all over value of British Columbia's forest production reached $282,000,000, and that figure leads all other industries by a wide margin.

The largest lumber mills are situated in the Vancouver and New Westminster area. Fraser Mills, located on the Fraser River near New Westminster, ranks as the largest diversified saw-mill in the British Commonwealth with a daily capacity of 800,000 board feet.

The Pacific coast pulp and paper mills are established on a sound basis and are steadily expanding. The use of new machinery to handle the smaller logs, the introduction of the hydraulic barker,

and the utilization of what was once considered waste woods have increased production over 25%. The pulp mill at Powell River, the largest on the West Coast, is one of the most modern in the world. Other large plants are situated at Ocean Falls, Woodfibre and Port Alberni.

At Port Edwards, near Prince Rupert, a $25,000,000 cellulose mill has been built. Here are produced high grade cellulose products. One of the world's largest plywood plants operates in New Westminster transforming logs into various plywood products.

Fishing.—The shores of the North Pacific are the home of some thirty-one different species of marine life — ranging from clams to whales. Of these, salmon is 'King' — the most valuable fish in the Pacific Coast waters. The first varieties to make their appearance are the spring, cohoe, and sockeye, followed by the pinks and chums. The prize fish for canning is the sockeye because, while rich in oil, the flesh is firm. Salmon are caught in traps, by trolling, and by means of purse seine and gill nets. Recent years have seen a great advance in the use of machinery on the fishing boats, and the day of hand fishing is rapidly disappearing.

Over-fishing for salmon in the Strait of Juan de Fuca and up the Gulf of Georgia to the mouth of the Fraser threatened to ruin a valuable industry. Since the salmon, on their way in from the sea, followed the American shore, it was necessary to arrange a a treaty with the United States. In 1930, a Commission was appointed with power to regulate hours of fishing, length of season, and methods of catch. Spawning grounds have been improved and cleaned of predatory fish. Restocking of these spawning grounds has assured the escape down stream of millions of salmon fingerlings. A major project of the Commission has been to build large scale fishways at Hell's Gate Canyon, a narrow gorge on the Fraser River. By means of these man-made fish 'ladders' the sockeye are able to reach the up-river spawning grounds, and once more the Fraser River shows signs that it may become the greatest of all salmon rivers.

The halibut frequent the shoal water of the banks from Fuca Strait to the Bering Sea. The best fishing grounds have been on the Queen Charlotte Island Banks. The flesh of the halibut is firm and white and, as it will stand freezing, it may be exported long distances in refrigerator cars.

Pacific coast halibut are sold as far east as Montreal, New York, and Chicago. Since the demand is greater than the supply,

there is danger that the halibut banks will be depleted. The halibut does not spawn until it is ten or eleven years old. One way to conserve the supply is to return the small fish to the sea. Another is strict regulation of the number of boats permitted in any given area and the placing of a closed season for several months each year. A halibut treaty has been arranged with the United States, and experts have at length solved the question of a steady supply of this highly prized food fish.

The length of the halibut season, protection of nursery stock, and other conservation measures are fixed by the Halibut Commission. During the past ten years under this expert control the stocks in the principal fishing areas have more than doubled, permitting a gradually increased annual quota for the fisherman.

Prince Rupert is the centre of the halibut fisheries. The port has one of the largest fish-freezing plants on the continent, and handles millions of pounds of halibut each year. During the rush season, trains of refrigerator cars leave Prince Rupert every few hours. Halibut are also landed at Petersburg, Juneau, and Ketchikan in Alaska, and Butedale, Vancouver, and Seattle, where freezing plants are in operation. Similar plants have been built at Victoria and New Westminster, where the rapid freezing process is used for fresh salmon and cod.

As the length of the halibut season diminished, fishermen of this coast have realized that tuna fishing is a valuable secondary occupation. The albacore, the tuna species caught by British Columbia fishermen, is a long-finned, fast-swimming fish. Prices paid for tuna run as high as $500 per ton and interest is rapidly growing in this new branch of the fishing industry.

Herring and pilchards are caught in large numbers along the coast of Vancouver Island.

Some of the herring are canned and some are processed into fish meal and oil. The meal is fed to poultry and live stock; the oil is useful for medicinal purposes, for soaps, cooking fats, linoleum, printers' ink, and oil-proofed clothing. A few are smoked for the local trade and sold as kippers, while some herring are used as halibut bait. A very useful fish indeed. The pilchard, a member of the herring family, follows the shore line in large schools. They frequent the west coast of Vancouver Island during the summer months.

Whaling.—A number of steam whaling vessels are operated out of Rose and Naden harbours during the summer months. There was a time when the whales were found close in shore, but now it is necessary to go out to the edge of the 'big drop' of the con-

tinental shelf. The whales cruise northwards during the summer, feeding on shrimp, herring, and pilchards. The captured whales are towed to port, hauled out on a slipway, and flensed. The oil is extracted from the blubber, the carcass is made into fertilizer and the bones ground into bone-meal. Every portion of the whale is utilized.

British Columbia leads Canada in the value of its fisheries products.

Ranking fourth among British Columbia's industries, the fisheries are still expanding. In normal times the products of the industry are valued at about $60,000,000 a year.

Mining at the coast is confined to the mining of copper, silver-gold, and coal. In many places along the coast glaciers have exposed the veins of ore.

Britannia Beach on Howe Sound boasts the largest copper concentrator mill of its kind in the British Commonwealth. Here some 5,000 tons of copper-gold are handled daily. The concentrates are shipped to the customs smelter at Tacoma, Washington. Britannia Beach is a typical 'company town', where everyone is in some manner connected with the mine or occupied in rendering service to the miners. If the mine were to close the town would cease to be.

Silver-gold.—Mines are in operation in the vicinity of Stewart at the head of Portland Canal. The communities are at the head of the Canal immediately south of the Alaskan Panhandle border. The Premier mine is 17 miles north-west of Stewart, head of navigation. Zeballos, on the west coast of Vancouver Island, was another important gold camp. High costs of mining, and the fixed price of gold have closed these mines until conditions change.

Beds of bituminous coal are mined at Nanaimo and Cumberland. These mines have played an important part in the development of trade and manufacturing along the coast. They are all close to tide-water and good harbours. However, coal has two serious competitors, fuel oil and hydro-electric power, and the use of both is increasing, while the output of these mines is declining.

Commercial centres of the coast district.—Victoria, the capital of the province, is situated at the south-eastern extremity of Vancouver Island, and dates from 1843, when Chief Factor Douglas arranged for the building of a Hudson's Bay Company fort on the shore of James Bay.

The population of Victoria and adjacent district is about 104,000, or two-thirds that of the total population of the island.

This concentration is due in part to the fact that it has long been the seat of government, and in part to its location on the main traffic route through the Strait of Juan de Fuca. Victoria faces the sea rather than the interior of the island. The city once held a monopoly of the trade by vessel up the west and east coasts of the island. The west-coast trade still remains, but the development of the port of Vancouver has drawn the trade of the east to Burrard Inlet.

The chief industry of the city lies in the lumber mills, shingle mills and sash and door factories which stand almost side by side along the narrow waters of the inner harbour. A rubber-roofing plant, machine shops, breweries, and ship-repair yards may also be noted. The outer harbour is enclosed by a large breakwater. Victoria is, however, essentially a residential city. Its beauties are known far and wide. The healthful situation, the many small bays which make it almost seagirt, the moderate rainfall (28 inches), and the mild climate are all factors in its appeal to the tourist and the retired business man.

The Esquimalt naval base, three miles west of Victoria, is the Pacific counterpart of the older Halifax station on the Atlantic. The entrance to the Royal Roads is strongly fortified, the harbour is several miles in extent and can give shelter to a large fleet. There are two drydocks, the larger of which will hold the largest Pacific ships, and Esquimalt dockyard is one of the best equipped ship-repair depots on the Pacific coast.

The fertile farm lands of Saanich peninsula supply dairy products and poultry, fresh vegetables, fruit, and flowers to the local market. Quantities of strawberries and hothouse tomatoes are shipped to prairie points.

At Bamberton, on Saanich Arm, there is the largest cement works in western Canada. Inside the entrance to Barkley Sound the Pacific cable station of Bamfield is in direct communication with Fanning Island and Australia. At the head of the sound, Alberni Canal almost cuts the island in two. Port Alberni has developed into one of British Columbia's leading lumber centres.

Operating in conjunction with the large sawmill, the new 165 ton sulphite pulp mill is converting into pulp the mill wood which formerly was considered as waste. The excellent harbour continues to favour Port Alberni as a centre for the lumber export trade of the Island.

The eastern coastal plain of Vancouver Island is one of the great logging districts of western America. The log-scale for this district has reached the imposing total of 1,108,000,000 board feet in a

single year. When the four-hundred-year-old monarchs of this primeval forest are gone, it is doubtful if this figure can be maintained from the smaller second growth.

In some parts of the coastal plain, farms have followed the logger. It is estimated that the plain contains 150,000 acres of arable land. Mixed farming prevails at present. The cost of clearing these heavily timbered lands has been almost prohibitive.

Duncan is the centre of a fertile dairying district at the mouth of the Cowichan River. Courtenay is the chief centre of the Comox valley, with similar products.

The eastern coastal plain lies in the rain-shadow of the Island Range and has a light rainfall during the summer and fall months. Areas for pasturage are of necessity larger here than in those countries where summer rains are frequent. However, this dry summer climate has been capitalized by Vancouver Island farmers, and the district is becoming known for the production of flower bulbs and garden seeds. A wide market has already been secured for sweet-pea seeds. The Department of Agriculture states that Vancouver Island should become one of the leading seed-growing centres of the continent.

Nanaimo, the coal city of the island, is developing as a commercial centre of the east coast. There is a daily steamer connection with Vancouver, forty miles away.

Vancouver City and the Lower Fraser Valley.—It is a fortunate circumstance for western Canada that the Fraser River found its way to sea north of the 49th parallel. The Fraser River floodplain is one of British Columbia's prize possessions. It has an area of about 900 square miles. The soil is fertile and the climate is mild, with an average yearly precipitation of sixty inches.

The Fraser floods in June with an annual rise of about nineteen feet. Because of this fact the rich bottom lands have been dyked. Drainage ditches and pumps keep the water-table in the soil at the right level, so that succulent pasturage may be had during the dry months of July and August. A yearly rainfall of sixty inches is not necessarily a sufficient amount for a dairying region. The seasonal distribution is of much greater moment. In the case of the Fraser delta lands, control of the water-table in the soil compensates for the deficiency of summer rain.

The disastrous floods of 1948 in the Fraser Valley made people realize the necessity for a greater measure of flood control.



THE LOWER FRASER VALLEY.

Products of the Lower Fraser Valley.—Throughout the Fraser Valley hay, grains, roots, small fruits and vegetables are produced, but dairying is the principal industry. Over half a million cases of evaporated milk are produced in modern factories such as the one at Abbotsford. However a large part of the milk is sold either in the raw state or as creamery products to the half million people living in the Greater Vancouver district.

The small towns of Chilliwack, Abbotsford, Langley, and Mission serve the surrounding farming areas with modern processing plants and cold storage for the strawberries, raspberries, loganberries and currants for which the Valley is famous. In a recent year over 1,000 cars of small fruits and 500 cars of tree fruits were shipped from the Fraser Valley. Of the 24 million dozen eggs produced in British Columbia, the major part was produced on the poultry ranches of the Fraser Valley. Hatcheries ship fine stocks of day-old chicks as far east as Winnipeg.

Vancouver is situated on a broad headland between the Fraser River and Burrard Inlet. The population of greater Vancouver is 530,000.

Sixty years ago there were less than a thousand people living on the shores of Burrard Inlet. The completion of the C.P.R., the building of a rail line to Seattle, the encouragement of Oriental trade, and the opening of the prairies to settlement laid the foundation of early Vancouver. Then came a second transcontinental line, the C.N.R., down the Fraser canyon, and the building of

the Panama Canal. All these have had their bearing on the growth of Vancouver as Canada's western seaport.

Burrard Inlet is a large, sheltered harbour, free from ice conditions during the winter months. Along its shores, wharves and warehouses have been built to accommodate the transhipment and storage of all commodities. Many people are engaged in this export and import trade which a seaport must, by virtue of its position, endeavour to handle quickly and cheaply. Cities, like stores, have competitors. Seattle and Victoria are near at hand, while Prince Rupert, Portland, and San Francisco are more distant rivals. Each city desires a large trade. That city will win the trade whose citizens by their industry provide the safest, speediest, and cheapest means of handling the freight which offers. Vancouver is forging ahead because these conditions are being well met.

Vancouver bears the same relation to western Canada that Montreal does to eastern Canada. The manufactured goods of Canada which are sold to the countries bordering the Pacific are assembled at the railway termini. The ships come up to the end of steel. They will always come as far into the land as possible, because sea transport is so much cheaper than rail. Montreal is nearly nine hundred miles from the Atlantic, yet the greatest tonnage of all eastern Canada finds its way up the St. Lawrence to Montreal. Halifax and St. John are more easy of access but are too far from the rest of Canada by rail. Quebec stands guard on the St. Lawrence below Montreal, but the ships pass by the ancient capital to reach the head of navigation at Montreal. In a similar way New York has become a great city because of the short Hudson-Mohawk route to the great lakes and the Ohio valley. Vancouver also has a strategic location; it has a good harbour, easy of access; the ships can come no farther to meet the railway lines, while behind the city the Fraser and its tributaries give low gradients to the heart of the continent.

An ice-free port such as Burrard Inlet is more convenient for shipping than ports such as Montreal and Quebec, which are ice-bound four months out of every twelve. Now that the prairies are producing 400,000,000 bushels of wheat, it is impossible to export such a huge crop by the lake route via Montreal before King Frost touches the waters and drives the vessels to other harbours. Much Canadian grain has therefore gone via Buffalo and by rail to New York, Philadelphia, or Baltimore. The opening of the Panama Canal, however, made it possible to export wheat westward through Pacific coast ports, especially during the



Courtesy C.N.R.

TOTEM POLE, STANLEY PARK, B.C.

winter months. Accordingly grain elevators have been built at Vancouver, and the export of grain has become one of the stable factors in the further growth of Vancouver in population and in commercial importance. The grain elevators at this port now have a capacity of 16,000,000 bushels, the largest on the Pacific coast of America.

Manufacturing.—Industries tend to locate where lines of traffic meet. This is particularly true where sea routes meet rail ends. Raw products can be brought by a cheap water route, and the finished articles may be sent out, either by rail or by boat, as the case may demand. This explains why Vancouver's manufactures are growing steadily in number and in size. For example, the Vancouver district is one of the great lumber manufacturing centres of the Dominion. Lumber mills, shingle mills, and plants

making sashes and doors, brooms, boxes, and barrels, give work to thousands of men.

Another good example of a well-located industry is the sugar refinery. Large freighters bring the raw sugar from far-away Cuba, Peru, and the East Indies. It is unloaded at the refinery on Burrard Inlet, where it is made fit for human use. From the refinery the sugar is sent to all parts of the province and to the prairies as well.

Power.—Vancouver excels in respect to the three main sources of power, coal, fuel oil, and electrical energy. The power factor alone has been a strong influence in the growth of Vancouver as a manufacturing centre. Coal from Nanaimo is brought across the gulf, forty miles, in 500-ton barges—a cheap method of delivery. Fuel oil is brought up the coast from California and Peru in tank ships. Oil refineries are located on Burrard Inlet. In fact the cheapness of fuel oil has seriously affected the production of the island coal mines. Hydro-electric energy, a most valuable and flexible source of power, is found in abundance within a reasonable distance of the city at Lake Buntzen and Stave Falls. This has been augmented by the new power development at Bridge River, which now supplies an additional 186,000 horse power.

For these reasons many manufacturing plants have been drawn to Vancouver. We have noted the lumber mills, grain elevators, and sugar refinery. Many other plants within the Vancouver industrial area manufacture a wide variety of articles.

At the present time, the Aluminum Company of Canada is developing a new power site at Kemano. The east-flowing Nechako River will be blocked by the Kenney Dam, and the river will be forced to find a new outlet through a chain of lakes to the west. From the huge lake thus formed, the water will flow through a mountain tunnel and drop 2,600 ft. to the power house at Kemano. The power developed here will be carried 50 miles to the aluminum plant to be built at Kitimat. The project should be completed by 1954.

Trade. Canada's once large and growing trade with Australia, New Zealand, South Africa, China and Japan was seriously affected by the war and immediate post-war conditions, particularly in the Orient. When normal trading relations are resumed, there is good reason to believe that volume will be much greater than in pre-war days and Vancouver will benefit proportionally.

Vancouver has a great future. It is linked with the growth of the western provinces and with that of Canada as a whole. As

Canadian trade with the Orient increases so will the trade of the port of Vancouver.

New Westminster, has been rightly called 'Canada's fastest growing freshwater seaport'. Located 23 miles inland from the Gulf of Georgia on the North Bank of the Fraser River, the city serves as a supply centre for the coastal lowland of the lower Fraser Valley. Here is to be found the largest concentration of big lumber mills on the Coast, handling over 650 million board feet of lumber per year—which represents about one third of the provincial output. This centre has developed into Canada's third largest exporting centre, shipping over one million tons yearly. Its docks see over 500 deep sea ships come and go each year; carrying to Great Britain, Australia, the United States, and the Orient, lumber and wood products, metals and fertilizers from Trail, farm products, frozen fruits and canned vegetables from the Fraser Valley, and canned salmon and frozen fish from the mighty Fraser River.

Of the 90 manufacturing concerns operating in the city, the most important handle lumber and wood products such as fir sleepers, plywoods, box shooks, veneers, doors and laths. Iron works produce machinery for canneries and the logging industry. A large paper mill, a rope factory, a cannery, flour and feed mills serve the trading district which has some 80,000 people.

(ii) The Interior Plateau

The interior plateau comprises that portion of the intermontane region which lies between the head-waters of the Yukon River and the Columbia plateau of Washington. The plateau is widest in the centre, narrowing to both the north and the south.

Appearance.—Throughout this large region one is impressed by the evidence of the forces of upheaval and denudation. Tongues of the ancient Cordilleran glacier have here and there pushed their irresistible way to the sea, as in those canyons of the Nass, Skeena, Fraser, and Columbia. The old plateau, once 4,000 feet high, has been scoured and worn until deep-cut valleys almost destroy the original level. So deep are the valleys that the higher lands remaining, or what we may call the original plateau levels, now appear as mountains, often rising 2,000 feet above the valley floor. A characteristic of many of these 'mountains' is the uniform level of their tops. Some might have been sheared off by a giant knife, so regular is the skyline of their crests. Once

the climber mounts the crest, he may find a grass-strewn, level expanse, the remnant of the original plateau. The main rivers of the plateau wind through the deeper valleys on their way to the sea; the tributaries are also sunk in deep gorges with steeply sloping sides.

Climate.—The plateau has a continental climate and, being in the lee of the Coast Mountains over which the Westerlies from the Pacific drop their moisture, is a dry land. The Coast Mountains act as a barrier to the mild influence of the ocean and eighty miles inland there may be a difference of 60° in temperature. In summer the grass cures on the stem as the heat increases and in winter the mercury goes down to, and below, zero.

The valleys of the central Fraser and Columbia Rivers are good range land with pines in scattered array on the hill-sides and bunch grass covering the slopes down to the river banks.

The Fraser River drains the larger part of central British Columbia, and comprises within its basin an area of 90,000 square miles. At Lytton, altitude 687 feet, the river cuts through the Coast Mountains by a canyon 67 miles in length, and drops 480 feet to Yale at the head of navigation. The cut scored through the mountain offers an easy gradient for the transport of commodities, and Canada's two transcontinental railways have blasted out road beds along the sides of the canyon. A motor road, the Cariboo Highway, has been completed. The railways follow the Thompson tributary to the confluence of the North Thompson at Kamloops. There the C.N.R. parts company with the C.P.R.

Kamloops is a divisional point on both railways and the commercial centre of the southern dry belt. Hay and grain are grown on the bottom lands, while cattle and sheep are grazed on the hill-side pastures. Some land is under irrigation and fruit is grown. Tomatoes grow quickly under the hot summer sun, and there is a cannery to take care of the tomatoes and other vegetables.

The Similkameen valley slopes to the south, draining to the Columbia. It is a true dry-belt area with grass-covered slopes, and higher elevations showing stands of spruce and jack pine. Cattle ranching is carried on throughout this district, while coal and gold are mined to some extent. The Kettle Valley Railway gives communication with the coast on the one hand and with the Okanagan on the other.

The recently completed Hope-Princeton Highway provides a shorter route from the Okanagan and Similkameen areas.

The central Fraser, Lytton to Prince George, drains the main portion of the interior plateau. This is an area roughly 200 miles wide by 300 miles long, comparable in area to Great Britain, but with less than one person to three square miles. It is a stock-raising country. 'The cattle feed on a thousand hills'; dusty trails wind down to deeply-sunken watercourses. Ranch buildings snuggle against a mountain side whence broad flats extend into the hazy distance. Green patches of alfalfa may be seen where irrigation is available. The pasturage is ample, the climate is dry and invigorating, but extension of the cattle industry depends upon securing water at a moderate distance from the hill pastures.

Quesnel is the port of entry to the gold mining of the Cariboo, where the miners took out $20,000,000 worth of alluvial gold from William's Creek alone. Barkerville was the centre of the search for alluvial gold and is now a centre of activity in lode mining, which is receiving attention.

Bralorne and Pioneer are the chief producing mines of this area, and they rank high among gold producing mines of Canada.

Prince George is the chief centre of the northern dry belt. Mixed farming, mining, and lumbering, together with trapping, are important industries of this region. Aeroplanes on the Alaska-Yukon route use the Prince George landing field for commercial transport and in the interests of national defense.

The Skeena River rises in the rolling plateau which borders the western slopes of the Cassiar Mountains, and cuts through the Coast Mountains in a narrow glaciated trough. The forested slopes provide lumber, but it is for its salmon fisheries that the Skeena is best known. Prince Rupert, built on Kaien Island at the mouth of the Skeena, is the northern terminus of the C.N.R. Over half the halibut caught on the Pacific coast of America is landed at its wharves for shipment to eastern centres.

The Okanagan Valley.—Along the eastern side of the interior plateau, at the base of the Columbia System, is a deep trough partly filled by the Okanagan Lake which drains through the Okanagan River to the Columbia. While it is an integral part of the plateau and has a climate and relief similar to the rest of the dry belt, it is necessary to give the Okanagan particular treatment because of the way in which the dry bench-lands have been made to yield their latent riches. The Okanagan is the great fruit district of British Columbia, and compares in productivity with the Niagara Peninsula of Ontario and with the Annapolis Valley of Nova Scotia.



Courtesy B.C. Travel Bureau

ORCHARD AND HOMES, PENTICTON, B.C.
Note the flat-bottomed valley and its relation to settlement.

The soils of the Okanagan are alluvial deposits on the floor of a freshwater lake which, at some ancient period, covered this part of the plateau to a depth of 2,000 feet. As the lake drained off the receding shore-line was marked by the 'benches' which now remain, often high above the present level of the lake. The virgin soils are fertile and well supplied with lime, phosphates and potash, while the ploughing under of alfalfa or clover furnishes the nitrogen content. As the annual precipitation is light, irrigation is provided from lakes and reservoirs in the hills.

Apples are the principal tree crop with over six million boxes being produced in a good year.

Truck garden products, such as onions, tomatoes, celery, cucumbers, and cabbage, show heavy yields per acre, and are now being produced on a larger scale. Factories make apple juice, wine, pickles, fruit by-products, and canned vegetables.

Vernon, at the head of the lake, is the distributing centre for some 6,000 acres of irrigated farm lands and orchards. With a rapidly growing poulation of about 10,000, it serves an additional district population of some 8,000 people. Here are to be found large fruit warehouses, dehydrating plants, and a modern creamery and ice cream plant. Further down the lake is Kelowna, population 9,000, the centre of a rich fruit growing district of some 6,000 acres of orchards. At the southern end of the lake is the thriving city of Penticton, with a population of 11,000, centre of an area ranking second in the acreage devoted to pears and peaches.

The Oliver-Osoyoos District, 22 miles south of Penticton, contains 12,000 arable acres under irrigation. The best early fruits

and vegetables in the valley are produced here. It is famous in British Columbia for its cantaloupes, and Zucca melons.

The whole valley is well supplied with packing houses, and cold storage buildings. Transportation is supplied by branch lines of the C.N.R. and C.P.R. The completion of the Hope-Princeton Highway now gives a direct road link with the cities of the coast.

(iii) The Columbia Mountains.

The Kootenay District.—The south-eastern section of British Columbia is no doubt the part referred to by early travellers as a 'sea of mountains'. The epithet fits. The Selkirk Range extends down the centre, the giant backbone of the triangle, dividing the land into East and West Kootenay. The particular feature of East Kootenay is the Rocky Mountain trench, which separates the Rockies from the Selkirks, and forms a deep trough five to ten miles wide. It extends to the border of Yukon Territory and is over 700 miles in length. The Columbia is the chief river of the Kootenay country. With its main tributary, the Kootenay River, it almost encircles the Selkirk Range.

The main line of the C.P.R. through Kicking Horse Pass gives access to the northern part of the district, and branch lines run south through the intermontane valleys. Revelstoke is a divisional point.

Southern Kootenay is today a hive of industry in comparison with the northern section adjacent to the C.P.R. main line.

Mining has been and still is the mainstay of southern Kootenay. In the early nineties gold mines were opened at Rossland, and during twenty years many millions in gold were recovered from these rich veins. A smelter was built at Trail to handle the ore. Then in 1919 came the discovery of a process which would economically separate the complex ores of the great lead-zinc deposits of the Sullivan mine at Kimberley. A concentrator was installed and has now 8,500 tons daily capacity, from which the concentrates are shipped to Trail. The Trail smelter has been enlarged until it now ranks as one of the largest electrolytic plants in the world.

Today the Kootenay district revolves around this 200 mile artery of trade: Trail to Kimberley, Kimberley to Trail. It is one of the best paying sectors of the whole C.P.R. system.

The Trail smelter is conveniently situated for its great ally, electrical power. About thirty-five miles distant on the Kootenay River near Nelson, at Brilliant, upper Bonnington, South Slocan

and Corra Linn are company power plants with a total output of nearly 400,000 horse-power.

The production from the Trail smelter and chemical plant is remarkable. It produces annually over 300,000 tons of the base metals, lead and zinc, representing 10% of the world's requirements of these metals. In addition, it leads Canada in the production of silver with 6 million ounces a year. The chemical plant produces about half a million tons of chemical fertilizers for the markets of the world.

Agriculture is carried on in the valley between Trail and Nelson. A large part of the arable bench-land has been cleared by Doukhobor settlers, and their communal dwellings are to be seen standing in the midst of their farming allotments. The industrial development of the region provides a market for their produce.

Nelson (7,000) stands on the southern side of the west arm of Kootenay Lake. It is a residential town and educational, distributing, and lumbering centre for southern Kootenay. Cranbrook and Fernie are distributing centres for the south and south-east parts of this district. Kimberley, a few miles north of Cranbrook, is the townsite adjacent to the Sullivan mine.

British Columbia's Tourist Trade.—British Columbia is particularly fortunate in that there are many tourist attractions. The beauty of the long, narrow fjords of the 'Inside Passage' assure full bookings for the steamship lines running from Vancouver to Prince Rupert and Alaska. The range country of the Cariboo with its innumerable lakes affords excellent sport for the fisherman and those who enjoy riding. The majestic scenery of the Canadian Rockies is unrivalled in North America. Big and small game hunting facilities are excellent and attract many during the fall.



Courtesy C.N.R.

Spectacular scenery can be seen all up and down the British Columbia and Alaska coast.

Scenic highways are making accessible all these areas and excellent accommodation is provided by the many tourist camps, hunting and fishing lodges, and fine hotels. The climate of the coast is attractive the year round and plays its part in attracting tourists from the east, the prairies, and from the United States. It is difficult to estimate the value of the tourist industry to British Columbia, but it undoubtedly ranks high among the industries of the province.

(iv) The Peace River District

It has been estimated that the total area suitable for agriculture within British Columbia is 35,300 square miles, an area three times the size of Belgium, and about equal in size to Hungary. The entire Peace River area, including both the Alberta and the British Columbia sections, covers 145,000 sq. miles. The Peace River district is estimated to contain 15 million acres of agricultural land, of which British Columbia claims over 2,331,520 acres. Only a small fraction of this area is under the plough, but since the war, greater development is taking place. During 1946-47 over 50,000 acres of new land were broken. As transportation facilities improve this vast country will be the home of many people looking for new rich lands.

The Peace River district is a vast plateau which falls away gradually toward the north-east. The plateau is level only in a comparative sense, portions being undulating, others rolling, others broken and hilly.

The streams tributary to the main rivers have eroded valleys in the plateau, and these ravines, sometimes 700 feet below the level of the plateau, break the general level of the surface. The Peace is the main drainage river. It is navigable from Vermilion Chutes to Hudson Hope, May to September inclusive.

The climate is moderate considering the latitude. The summer mean temperature is about 58° F., and winter mean 1° F. The winters are dry, with clear skies, a moderate snowfall, and little wind. From time to time the chinook brings milder weather. Spring comes quickly with the lengthening days. The ice breaks on the water in late April or early May. In midsummer there is practically no night, but a gentle and gradual transition from daylight to twilight and then to sunrise. Early ripening strains of wheat mature in 110 days. The longer hours of sunshine offset the shorter growing season of this latitude. Seeding begins in mid-April, and once the seed germinates growth is continuous. The rainy season begins at the end of May and lasts during June,

providing all the moisture necessary to carry the wheat plant to maturity. September and October are usually pleasant months, with warm days but colder nights. October sees heavier frosts, and ice forms in November.

Products.—This most northerly of the wheat-producing areas in North America has soil of great depth and uniformity. Grain-growing, mixed farming, and ranching are the principal occupations. In recent years some remarkable records have been made in yields: wheat 70 bushels and oats 100 bushels to the acre. Barley, rye, and peas also give heavy yields. In 1926, and again in 1930, 1931, and 1932, wheat and oats from Peace River won the world's championship at Chicago. A rye sample, known as Hurricane, winning world honours in 1946, was grown in this area. Today, the Peace River district of British Columbia produces about one-half million bushels of wheat, and the same amount of oats, yearly. Farmers also have large herds of cattle which run out all winter. The raising of hogs is increasing in importance as northern markets in Alaska are opened up.

Good stands of spruce have interested lumbermen, and geological surveys have proved that rich mineral deposits exist. Coal at Hassler Creek and oil and natural gas await development.

Settlement and Communications.—Settlement of the Pouce Coupe prairie dates from about 1909. Within five years a considerable area had been homesteaded. With the construction and completion of the Alaska Highway in 1942, Dawson Creek sprang into importance as the Southern terminus. Today it is the largest town in the British Columbia section with some 3,300 people, and 4,000 in the outlying districts. The town has seven grain elevators and modern stores, hotels, schools and churches. Five miles from Dawson Creek is Pouce Coupe, administrative centre of the Peace River block. Fort St. John is another rapidly developing town. It is 50 miles north of Dawson Creek.

The second World War saw the construction of the Alaska Highway which links Fairbanks, Alaska, to Dawson Creek. The new Hart Highway when completed will connect Prince George to Dawson Creek, thus providing an all British Columbia route to this rich area. Plans are already underway to complete the P.G.E. Railway to Prince George. When this is completed there is good reason to expect the Peace River district to grow very rapidly.

EXERCISES

1. If you were a shipowner, and your freighter, discharging cargo at Callao, received a cable to load wheat at Vancouver for Liverpool, which would you rather do: send your ship to Vancouver in ballast, or take a small cargo north at a reduced rate? What cargo could you load at Callao which might be made fit for use in western Canada? Can it be said that the export of wheat helps the other industries of Vancouver?

If a ship lies twenty days in the harbour of Vancouver awaiting her place at the dock to load wheat, some of the following may be done: the ship may be painted; the engines cleaned and overhauled, possibly some repairs made; the hold will be lined with plank in readiness to receive the bulk grain. The cook will lay in a supply of food for the voyage; the sailors will get shore leave and see the sights. Will anyone benefit from this? It has been estimated that a grain ship arriving in Vancouver to load wheat leaves $5,000 while there. If thirty vessels a month load grain at Vancouver, what would this be worth to the merchants of that port?

2. Compare the Western Cordillera of North America with that of Europe under headings such as these: (*a*) Direction of ranges; (*b*) Total length; (*c*) Names of ranges; (*d*) Chief passes; (*e*) Highest mountain peaks.

3. Compare the Cordillera of North America with that of South America. Which is the longer? the wider? the higher?

Which highland has the larger interior plateau?

In what respects are Great Salt Lake and Lake Titicaca similar to one another? Is either of any value?

4. Can you locate a primary highland in Asia? How do the Himalayas compare with the Rockies in height?

5. On a large sheet of paper make a drawing of the chief ranges of the North American Cordillera. Mark the following peaks on your map. Rocky Mountains, lat. 49 to 60° N.: Mt. Robson, 12,972 ft.; Mt. Columbia, 12,294 ft.; Mt. Alberta, 11,874 ft.; Mt. Selwyn, 11,013 ft.; Mt. Athabaska, 11,452 ft.; Mt. Assiniboine, 11,870 ft. Rocky Mountains, lat. 29 to 25° N.: Pike's Peak, 14,408 ft.; Mt. Massive, 14,402 ft.; Mt. of the Holy Cross, 14,008 ft.; Mt. Elbert, 14,420 ft.; Granite Peak, 12,850 ft.; Garnet Peak, 13,785 ft.; North Truchas Peak, 13,306 ft.

6. Mark the following passes. In Canada: Peace River, 2,000 ft.; Pine River, 2,850 ft.; Athabaska, 6,025 ft.; Howse, 4,500 ft.; Yellowhead, 3,712 ft.; Kicking Horse, 5,332 ft.; Crow's Nest, 4,459 ft. In the United States: Boseman Pass, 5,528 ft.; Sherman, 8,009 ft.; Raton, 7,008 ft.; Tennessee, 10,240 ft.; Marshall, 10,846 ft.; Lewis and Clarke's, 6,323 ft.; Mullan's, 5,546 ft.

Pike's Peak has a railway to its summit. Could we run one to the top of Mt. Robson? Which passes are used as highways of traffic?

7. The Rocky Mountains are a great drainage divide. Insert on an outline map of North America the main rivers flowing east from their crest, and west to the Pacific. Use red ink to mark off the drainage

basin of each of the large Pacific slope rivers. Fill in the areas of these river basins in square miles, or make a bar graph to show the relative size of each basin.

8. The Great Basin is an area of interior drainage. Why are there no large lakes in the Nevada section? Can you find similar areas in Asia? in Australia? in Africa?

9. There are many national parks and playgrounds in the Cordillera. Arrange a trip to one of the following: Jasper Park, Banff, Garibaldi, or Yellowstone Park.

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12

THE NORTHLAND REGION

One of the least known, but most talked of regions in Canada is the great stretch of rocks, forest, rivers, lakes and tundra, lying between latitude 60° north and the North Pole. This enormous land mass, roughly more than a third of the whole of Canada, is divided into the Yukon Territory, with an estimated area of 207,000 square miles, and the Northwest Territories, with an area of 1,304,902 square miles. The Northwest Territories are subdivided into Mackenzie District, stretching from the Yukon border to the 102nd meridian of longitude, Keewatin District, continuing eastwards to Hudson Bay and including the islands in Hudson and James Bays, but excluding Boothia and Melville Peninsulas, and Franklin District including these peninsulas, the islands in Hudson Strait, and all the islands between the mainland and the North Pole.

Considering the size of this great northern region the population is very small; in fact it is one of the most sparsely populated regions in the world, and is likely to be so for many years to come. The



Whitehorse, Yukon Territory
River boats still handle much of the transport in the far north.

population of the Yukon in 1949 was 8,641, and that of the Northwest Territories was estimated in 1947 to be 15,199. In the Yukon the white population predominates. In 1949 there were 7,141 whites, 1,447 Indians, and 53 Eskimos. In the Northwest Territories there are only 5,214 whites, but 4,334 Indians and 5,651 Eskimos.

Importance of Northern Canada.—The importance of this region, not only to Canada, but to the whole of North America, lies in its position across the shortest air routes between the populated part of North America, and Europe and Asia. Canada's next door neighbour across 'the top of the world' is the Soviet Union, thus Canada lies not only between Europe and Asia across the Atlantic and Pacific, but between the United States and Soviet Russia across the Arctic Ocean.

Another reason for the strategic importance of northern Canada is the fact that many of our storms develop in this region. Meteorological, or weather, stations established along the northern fringes of the continent, can send out reports of moving air masses which will later determine the weather of southern Canada and northern United States, as well as the North Atlantic.

But strategic position is not all that northern Canada has to offer; it is rich in its own right, rich in furs and rich in minerals, rich too in potential water-power, and, in many places, rich in majestic scenery and in the possibilities for relaxation and sport sought by tourists. Just how rich the country is, is not yet fully known, although a remarkable piece of work has been done in photographing and mapping the region from the air. It is known, however, that minerals of many kinds—gold, silver, uranium, radium, copper, lead, zinc, tungsten and tantalum are present, particularly in the ancient rocks of the Canadian Shield. Some coal is also found in younger rocks adjacent to the Shield. In the younger rocks, especially in the Mackenzie Valley, oil is present in large quantities. In the valleys of the Yukon, the Mackenzie and most of their tributaries, alluvial soil of good quality would make possible the raising of any crops suited to a cool continental climate. All these riches await the development of means of transportation, and a greater population.

Difficulties Facing Development.—Before making too optimistic an appraisal of the possibilities of the Canadian Northland, it is wise to consider the difficulties facing development. The greatest is probably the great distance to the industrial centres, or even to the moderately populated sections of our country. This

makes it economically impossible to mine the base metals, for instance copper and zinc, under present conditions. Even the development of oil wells in the Mackenzie Valley has been slowed down markedly since the end of the second World War.

Other difficulties are the intense cold of winter, the short growing season, and the lack of sufficient precipitation, which makes crop raising difficult, even in those limited areas where it is possible. Weather conditions, too, often hamper the use of aircraft, and make regular flying schedules almost impossible. Two other less familiar, but important difficulties are the hordes of mosquitoes and other insect pests which torment both man and beast during the short summer, and the fact that the health of the white population suffers from lack of sunlight during the long winter, and the almost continuous sunlight of summer which makes it difficult to get sufficient sleep.

However, in spite of all these disadvantages, the Canadian Northland holds enormous possibilities, and its wise development is a challenge to all Canadians.

Administration of Northern Canada.—The administration of the Territories is not similar to that of the Provinces, due partly to the widely scattered centres of population and to the unreadiness of the natives for self-government. The care of all natives, both Indian and Eskimo, lies with the Federal Government, and is carried on chiefly through the Department of Resources and Development. The machinery of government differs somewhat in the Yukon and Northwest Territories.

The Yukon is governed by a Controller at Dawson, assisted by three elected members, one each from the electoral districts of Dawson, Whitehorse, and Mayo. The ordinances passed by this body are subject to the approval of the branch of the Federal Government known as the Department of Resources and Development. The Yukon was also represented by one member in the Federal Parliament. In 1947 this electoral district was extended to include that part of the Mackenzie District west of the 109th meridian of longitude. There are three mining districts with a Mining Recorder at Dawson, Whitehorse, and Mayo. The enforcement of law and order is carried out by the Royal Canadian Mounted Police, who have posts scattered strategically throughout the whole Northland.

The Northwest Territories are governed by a Northwest Territories Council sitting at Ottawa. The Council consists of a Commissioner, a Deputy Commissioner and five members, all appointed by the Governor-General-in-Council at Ottawa, and

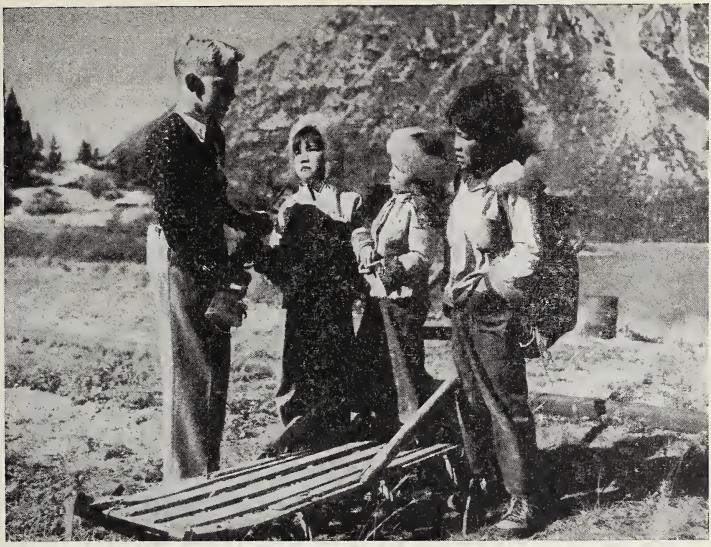
responsible to the Minister of Resources and Development. The administrative office for Mackenzie District is at Fort Smith and the chief office for the transaction of mining business is at Yellowknife.

The Federal Government maintains meteorological stations to give out weather reports, radio and signal stations, and police barracks at strategically chosen places throughout the Northland. Hudson's Bay posts are also widely scattered, and through these the greater part of the trading is carried on.

Native Peoples.—By treaty with the original inhabitants, and according to the regulations of International Law, Canada, through its Federal Government, assumes care of all native peoples, half-breeds and indigent whites, until such time as they are ready to assume the full privileges and responsibilities of citizenship. This involves protecting their rights, safeguarding their health and educating their children.

To protect the rights of the natives to hunt, fish, and trap for their livelihood, conservation methods have been adopted. Open and closed seasons for the trapping of certain animals have been declared. No white person who has entered the Territories since 1938 is allowed to trap. *Preserves* has been set aside in which only Eskimos, Indians, and half-breeds are permitted to hunt or trap. In addition there are *Sanctuaries* where no hunting or trapping is allowed. In the Thelon Game Sanctuary is the largest herd of muskox in existence, and in the Wood Buffalo Park, the largest herd of bison in the world. Both these animals were almost extinct. Now the bison have increased to the point where a certain number can be slaughtered each year providing both meat and hides. In addition, to the east of the delta of the Mackenzie River is a *Reindeer Reserve*. In 1929 a herd of reindeer were purchased from an Alaskan reindeer company and were driven into Canada under the care of experienced Lapp herders. After almost unsurmountable difficulties and heavy losses, the herd reached the range prepared for it east of the Mackenzie delta. Since that winter of 1934-35 the herd has increased remarkably. Eskimos are trained as herders, and when capable are granted herds to be paid for on easy terms.

To safeguard the health of the natives and to teach them sanitation, the Indian Health Services of the Department of National Health and Welfare send out doctors to serve as medical officers at various posts in the Territories. Nursing stations are also maintained at other posts and grants of money are made to mission hospitals. When necessary the R.C.A.F. carries doctors and nurses



Courtesy C.N.R

A tourist meets natives of Alaska.

to stricken communities or brings out isolated patients to hospitals. The Eastern Arctic Patrol carries medical officers to examine and treat the natives at the various ports-of-call. In addition to government services the more important mining companies maintain fully-equipped hospitals for their employees. In spite of all this, much remains to be done.

Education of the natives has been largely conducted by the various missions, which are then subsidized by the Government. Recently however several schools have been built by the Government and an Inspector of Schools was appointed in 1946.

Contrary to the belief that the native peoples are dying out, they are actually making a slow, but steady, increase in numbers. Much however remains to be done to preserve their ancient cultures and to assist them to make the most of their environment.

THE YUKON TERRITORY

This, the oldest and most developed of the Territories, stretches from latitude 60° north to the Beaufort Sea, and from Alaska to the crests of the Mackenzie Mountains. It is a land of rivers, mountains and lakes, much of its area being a plateau of over 4,000 feet in elevation. On this plateau are all the chief settle-

ments except Old Crow which is in the far north. In the south-west corner of the Territory is the St. Elias Range, with two of the loftiest peaks in Canada, Mount St. Elias and Mount Logan. The Yukon River is navigable from Whitehorse to the Bering Sea, a distance of over 2,000 miles. In its upper reaches the Yukon and its tributaries have cut deep trenches into the plateau. In the south is a system of beautiful lakes which are beginning to attract the attention of tourists.

Climate.—The climate of the Yukon is extreme, and quite variable. The winters are always cold, but some years the average temperature hovers around 40° below zero, while during other years it is only around zero. The deciding factor is the direction of the movement of great air masses, those from the Arctic bringing intense cold, those from the Pacific to the south bringing warmer air. Since the settled parts of the Yukon are but little south of the Arctic Circle, the winter days have only a few hours of sunlight. The summer daylight, on the other hand, lasts almost twenty-four hours. This fact helps to account for the astonishingly high temperatures often registered during the three summer months. However, in spite of the warm days, frost is a possibility during any month of the year, although rare between the middle of June and the middle of August. Precipitation in general is light, so that sufficient moisture for crops is often lacking.

Mining.—Yukon sprang into fame almost overnight with the discovery, at Bonanza Creek in the Klondike, of one of the richest deposits of gold ever found. Thousands of gold seekers, many of them quite unprepared for the difficult and dangerous journey, swarmed into the Yukon by various routes. At one time Dawson City had a population of over 30,000, today it has less than 1,000.

In the early days of placer mining, gold was 'panned', and even by that slow method much was recovered. When this method of mining ceased to be profitable, 'hydraulicking' was begun. Great streams of water were used, and hillsides were literally washed into the riverbeds. Today dredges, working on the principle of the earthworm, suck up the gravels of the riverbed to be washed and screened. While gold is still the most valuable mineral of the Yukon, silver-lead ore is mined at Mayo, copper has been mined near Whitehorse, and gold, silver, antimony and copper are known to be present near Carcross. The total value of minerals produced in the Yukon in 1948 was $4,265,910.

Fur Trade.—While trade in furs was not the initial interest which opened up the Yukon, to the extent that it was in the other ter-

ritories, it has contributed much to its development. Many a disappointed miner remained to make a livelihood, if not wealth, by trapping. The total value of furs produced in 1948 was about a quarter of a million dollars.

Forestry.—Although the forest wealth of the Yukon has scarcely been touched, wood is of prime importance, both for fuel and for construction purposes. Even the river steamers burn wood, consuming a surprising amount. Below the 4,000 foot level, the most common trees are spruce, lodgepole pine, aspen, balsam and a few birch.

Fisheries.—While fishing has never been developed as a major industry, the rivers and lakes have plentiful supplies of salmon, whitefish, lake trout, rainbow trout and grayling. Such game fish will eventually lure more sportsmen to the lovely lakes and rivers of the southern part of the Territory.

Transportation.—As in all undeveloped regions, transportation in the Yukon presents a major problem. A narrow guage railway connects Whitehorse with Skagway in southern Alaska on Lynn Canal, an arm of the Pacific Ocean. From Whitehorse, river boats (stern-wheelers) and barges carry passengers and freight to Dawson, and beyond into Alaska. The Alaska Highway cuts across the southern part of the Territory passing through Watson Lake, Whitehorse, and Burwash Landing. There is an all-season road between Whitehorse and Mayo. Air transport is increasing in importance, carrying mail and important freight as well as passengers. Whitehorse is also on the Northwest Staging Route between Edmonton and Fairbanks, and has a good airport making possible regular flying schedules and the use of wheeled planes. The Canol pipeline, with its auxiliary highway built by the United States Government during the second World War, had its southern terminus at Whitehorse. Both the pipeline and the road are unused today, due to the high cost of maintenance.

Chief Settlements.—**Dawson** was the seat of government for the Territory, and is usually spoken of as a ghost town. Built to house a population more than ten times its present size, it has many unused and decaying buildings. It has a picturesque site on a level stretch of land between a high bench and Moosehide Mountain, and a loop of the Yukon River, and is by no means dead. As a pioneer settlement it is well equipped, with churches, a hospital, elementary and high schools, an airport, a radio station and a weather station, hotels, shops and a movie theatre. Agriculture

on a small scale is carried on near the town, to provide fresh vegetables for the residents. There is a dairy herd put to graze on grassy pastures near the airport, and stabled and fed during the winter. Tomatoes are raised and ripened in greenhouses and much of the crop is shipped to Whitehorse.

Whitehorse, in contrast to Dawson, is a growing town. During the second World War it was a hive of activity as the terminus of the Canol pipeline and the supply depot for much of the Yukon. Now the refinery at Whitehorse is shut down, and oil has ceased to flow, but the town is still important, at the head of navigation on the Yukon, as the terminus of the railway from Skagway, and as an important supply depot on the Alaska Highway. It has a year-round airport on the Northwest Staging Route, over which several airlines operate. The town is the successor to Dawson as the seat of government for the Territory.

Other Settlements.—Mayo, east of Dawson, on the Stewart River, is a mining centre. Silver and lead are mined and the concentrates are shipped out by water or road to Whitehorse, by rail to Skagway and then by boat to the outside.



Courtesy National Film Board

A typical Eskimo family in their igloo home in the Northwest Territories.

Other centres are Watson Lake in the east, Carcross on the railway line to Whitehorse, Carmacks, Fort Selkirk, and Stewart River on the river route between Whitehorse and Dawson, and Old Crow, an Indian settlement in the far north.

THE NORTHWEST TERRITORIES

The historical background of the Northwest Territories is filled with tales of adventure, courage and daring, unequalled anywhere in the world. It centres chiefly around the search for the Northwest Passage by sea, and the search for furs carried on by the Hudson's Bay and Northwest Companies overland. Names like Davis, Frobisher, Hudson, Hearne, Mackenzie and Amundsen recall to us these stories of courage and sacrifice. In more recent times the saga of the bush pilots and mining prospectors is just as thrilling, if not as well known.

MACKENZIE DISTRICT

Of the three districts, Mackenzie is by far the most important and will undoubtedly continue to be so, due to its great water highway, and its varied resources. The western boundary is along the Mackenzie Mountains. In the east is the vast Canadian Shield, while between is the Mackenzie Lowlands, a continuation of the great lowlands stretching from the Gulf of Mexico to the Arctic Ocean, drained by the Mackenzie River. To the east, the Canadian Shield is rimmed around by the three great lakes: Great Bear Lake, Great Slave Lake and Lake Athabaska. The general trend of the mountains and Mackenzie River Valley is from south-east to northwest.

The Mackenzie River with its tributaries, the Athabaska and the Slave Rivers, is one of the great water highways of North America—1,700 miles from Waterways, Alberta, to the Arctic Ocean. However, the short season of open water, and the threat of shallow water, make navigation difficult.

Climate.—The climate of the Mackenzie District is the most favourable of any of the Territories. Winters are indeed cold and long, with very little daylight, but the summers, while short, are remarkably warm. The length of the growing season, even as far north as Aklavik on the Mackenzie delta is about the same as that on the north shore of the St. Lawrence in Quebec, while stations farther up the river have a growing season as long as that of the Gaspé Peninsula. In addition, the long hours of daylight make temperatures between 80°F. and 90°F. not uncommon. The

amount of precipitation is the greatest difference between the Mackenzie Valley and Gaspé, as the former has much less precipitation — both rain and snow. As a matter of fact, drought, rather than cool summers or a short growing season, is the greatest obstacle to agriculture.

Fur Trade.—This, the oldest industry of the Mackenzie Valley, dates back to the early days of the Hudson's Bay Company. It has continued through the years to give employment to natives and white men alike, and in 1948 the total value of furs taken from all the Northwest Territories was $1,872,302. The Aklavik region leads, with an average annual value of around half a million dollars. The muskrat and the Arctic white fox are the two most important species. The first is important due to the large number of skins taken, and the latter for the high value of each pelt. Other furbearing animals are the beaver, marten, fisher, ermine, mink, and cross, red, and silver foxes.

Mining.—Samuel Hearne, in the latter part of the eighteenth century, was lured — chiefly on foot — across one of the most barren regions of Canada, to the Coppermine River, in the hope of finding copper. The copper was there as the Indian had said, but most of it still remains waiting to be mined, since the metal produced will not pay for the costly haul to civilization. The same thing is true of a variety of other metals, but there are a few notable exceptions.

In 1930 Gilbert LaBine found pitchblende ore on the shore of Great Bear Lake. To develop a mining industry in so inaccessible a region was an undertaking of great difficulty, but the Eldorado mine began producing in 1933 and between 1934 and 1939 had produced minerals valued at over seven a half million dollars. Radium was the most valuable mineral derived from the ore, and Canada became one of the two most important producers in the world, the other being the Belgian Congo. Almost overnight, competition forced the price down from $70,000 to $25,000 a gram. Only a mineral of so fabulous a value could stand the cost of the long haul out. The ore is concentrated at the mine site and the concentrates are shipped by barges across Great Bear Lake, transhipped to smaller barges to begin the trip down the Great Bear River, hauled by road 8½ miles around rapids, again shipped by barge down the river to its mouth at Fort Norman, then up the Mackenzie to Great Slave Lake, across the lake to the mouth of the Slave River, up the Slave River to Fort Smith, by truck overland 16 miles to Fitzgerald, on up the Slave River to

Lake Athabaska, across Lake Athabaska and up the Athabaska River to Waterways. It is then shipped by rail to Port Hope, on the north shore of Lake Ontario, where it is refined.

During the second World War, when atomic energy was developed, uranium, the raw product from which it is produced, was sought the world over. Now uranium is also present in pitchblende, so the Canadian Government in 1944 expropriated the shares of the Eldorado Mining Company at the mine site of Port Radium. The mine plant was extended, and by 1945, 200 men were employed. The men are comfortably housed and the community is provided with library, recreation room and hospital.



Courtesy National Film Board

ELDORADO MINE, PORT RADIUM
One of Canada's most strategic producers of pitchblende.

Yellowknife gold mines are another important development in the Mackenzie Valley. There are several of these mines on or near Yellowknife River and Bay, on the north shore of Great Slave Lake. The first gold brick was poured in 1938 and in 1942 gold, to the value of $3,826,000 was mined. During the war man-power difficulties caused mining to be suspended, but by 1948 operations had been greatly expanded, and a hydro-electric plant had been built on the Snare River to provide power. Today the town of Yellowknife is the best developed in the north. It has an elected town council, a hospital, an elementary and a high school, an airport, and a radio station, as well as churches, shops and a weekly newspaper.

The third important mining industry of the Mackenzie District is centred in the oil production of Norman Wells. This is the most northerly of all the oil pools found in the sedimentary rocks of the central plains of North America, which extend from the Gulf of Mexico to the Arctic Ocean. The first well was brought into production in 1920, and the second in 1925, but at that time there was little use for oil so far from centres of population. With the development of the mining industries on Great Bear Lake and at Yellowknife a pressing need for oil arose. Two more wells were brought into operation in 1939 and 1940 and a refinery was built at Norman Wells. During the second World War the need for oil, in the defence of Alaska and the whole Northwest, became so great, that the United States and Canada entered into an agreement whereby the former would proceed with a development of the petroleum industry known as the Canol Project. Well after well was drilled, until sixty more were found capable of producing oil in commercial quantities. The refinery at Norman Wells was enlarged and another built at Whitehorse. Between the two a pipeline was laid, over mountains and across rivers and muskeg. A parallel road was also built to service the pipeline and to meet the Alaska Highway at Johnston's Crossing. With the end of the war the chief demand for petroleum ceased, and most of the wells were capped or plugged, the Canol Pipeline and road were abandoned, and the refinery at Whitehorse closed down. But with the extension of mining at Port Radium, the normal peacetime demand for oil was increased, and in 1947, 231,844 barrels were produced. Difficulties of transportation are still the greatest obstacle to expansion of the industry. As population in the mining centres increases and as boats powered by diesel engines replace the old wood-burning stern-wheelers, wider use of the available supplies of oil should be made.

Agriculture in the Mackenzie District.—Land suitable for crop production exists only on the river flats and terraces bordering the Mackenzie River and its tributaries, and west of Great Slave Lake. While no large area is available, many small farms and market gardens would be possible, if a market for the produce existed within a reasonable distance. Experimental agricultural sub-stations have been established at Fort Simpson and Yellowknife. Reasonably good crops of small fruits and such hardy vegetables as potatoes, carrots, beets, turnips, peas and cabbages have been produced. Potatoes in large quantities could be raised. Where irrigation of the gardens is possible, the yield is greatly increased.

Tomatoes cannot ripen outdoors beyond Fort Smith, but they are either picked green to ripen indoors, or grown under glass. Field crops of oats, barley and even wheat are grown, but in many localities these are cut green to provide fodder for farm animals during the winter. Since fresh vegetables, fruits and meat are so necessary to maintain the health of residents of these northern lands, every settlement, even the smallest trading post, is encouraged to supply its own needs as far as possible. An extension of agriculture in the north will only be possible as the population of mining and fur-trading settlements increases.

Fishing.—Since the earliest days fish has been one of the staple articles of diet in the north. Before the days of scientific planning of diets, many residents of the north existed on the monotonous diet of fish and potatoes, potatoes and fish, with tea and evaporated milk when available. Most of the rivers and lakes abound in good fish. Within recent years commercial fishing has been developed in Great Slave Lake. The fish are frozen and much of the catch is shipped to more southerly points in Canada and the United States. Whitefish supply most of the catch.

Forestry.—Forestry is not an important industry, although trees are plentiful in the Mackenzie Valley. The principal species are willow, aspen and balsam, poplar, spruce, white birch, tamarack and jack pine. Most of the lumber is produced to satisfy local needs; spruce for construction purposes, tamarack for boat frames, birch for canoes and snowshoes, jack pine for log cabins, and poplar for fuel. Near mining developments lumber is also needed for pit props.

Transportation.—As has already been mentioned, the difficulties of transportation in the Canadian Northland form one of the chief obstacles to progress. At present, and for many years to come, heavy equipment and bulk cargoes must be water-borne.

The Mackenzie River Route, with only one portage in the 1,700 odd miles between Waterways and the Arctic Ocean, is the lifeline of the north. Down this stream, during the short summer season, go equipment and provisions for all the northern settlements, to last them until summer comes again. Upstream on the return journey come ores and furs, the wealth of the Northland. The boats used are all diesel tugs and shallow-draught barges, a few of these being refrigerated. Such carriers are needed, due to the shallow water and shifting channel in this region of scant rainfall. The normal time for a trip from Waterways to Aklavik is 16 to 20 days; the return trip upstream requires about

twice as long. This means that two trips a season are all that can be hoped for, since one of these must continue on from Aklavik to Port Brabant (Tuktoyaktuk), to the east of the Mackenzie delta. If the spring thaw is late, only one round trip is possible. Navigation on the three great lakes, Athabaska, Great Slave and Great Bear, is difficult and often dangerous. Boats suited to the shallow waters of the rivers are entirely unsuited to battle with rough water and heavy winds. All of the wood-burners have been converted to oil, and tug boats and motor boats are being added to the fleet.

Within the limits of the Northwest Territories there is no rail route such as that from Whitehorse to Skagway. But within northern Alberta and British Columbia are two routes so vital to northern development that they deserve mention. One is the route from Edmonton to Waterways, the head of navigation on the Mackenzie River Route; the other is from Edmonton to Dawson Creek, in northern British Columbia, the southern terminus of the Alaska Highway.

Roads in the Northland are almost non-existent, except for a few miles from the chief settlements. The Alaska Highway and the road parallel to the Canol Pipeline were built as defence measures and at a great cost. The former is being maintained, the latter has been abandoned. Maintenance costs, where the road crosses muskeg, and where the ground never completely thaws out, were too high. Between Fitzgerald and Fort Smith two parallel roads make it possible to truck freight around the 16 miles of rapid water in the Slave River. During the war the road was continued eight miles downstream to Bell Rock. One road of considerable importance has been completed. It had for years been used as a winter road, connecting Grimshaw, a railway terminus in northern Alberta, with Hay River on Great Slave Lake. From this point cargoes can be carried, by boat in summer, and across the ice in winter, to the Yellowknife mining settlements.

Tractor trains are becoming increasingly important in northern transportation. A train consists of a powerful tractor, a train of sleds — 28 are said to be a maximum — and a caboose. The crew usually consists of two drivers, two brakemen and a cook. The trains move forward night and day. They must avoid rough ice and steep slopes. The canoe in summer and the dog-sled in winter are still commonly used in the more isolated parts of the north country.

The aeroplane is of course the means of transportation which did more than anything else to put northern Canada on the map.



Courtesy International Harvester Company

Crawler tractor train hauling supplies through virgin country to the Ontario Hydro development at Waboose Falls, Oagoko River. The train crew have their living quarters in the caboose.

Flying in the Mackenzie District was begun in 1921. By 1926 air mail service was started. By 1928 air services, of a sort, were available all over northern Canada, and surveying and mapping from the air were going forward. Planes used floats in summer and skis in winter to permit them to land on the innumerable lakes and streams. Two companies, of the many that began operation, were Canadian Airways and Mackenzie Air Service. Today Canadian Pacific Air Lines controls most of the regular scheduled routes beyond the Trans-Canada Air Lines routes. The mining companies have their own planes, and many independent operators work on a charter basis. Air fields have been built at the more important settlements, permitting the use of wheeled planes. Smaller settlements have air strips. Posts, which formerly received mail only once a year, now have a monthly or weekly service. Then came 'the flying box-car,' a type of plane, capable of carrying heavy mining equipment, a cow or horse — in fact almost anything needed in these isolated settlements. Without the aeroplane, Yellowknife would never have come to life. The aeroplane is not by any means however, the answer to all the transportation problems of the north. For one thing rates are too high; bad weather often makes flying impossible for days at a time, and during freeze-up and break-up neither floats nor skis can be used.

Settlements.—Fort Smith on the Slave River, just over the border from Alberta, is the centre of administration for the Northwest Territories. During the time of feverish activity brought about by



Courtesy Ont. Dept. of Lands and Forests

BEAVER A/C IN FLIGHT, SUDBURY, ONTARIO
Designed and built in Canada for the Canadian north.

the development of Norman Wells and the Canol Pipeline, Fort Smith was a very busy place. The town is built on a level terrace about 150 feet above the river. It boasts two churches, a hospital, a public and a high school, a police post, a meteorological station, a radio station, and the usual stores. It owes its importance to the fact that since it is at the lower end of the rapids on the Slave River, all cargo moving by water must be transhipped here. A good many crops are grown around the settlement, wheat and oats, as well as garden vegetables and small fruits.

Aklavik on the Mackenzie delta is the second place of importance. It is the only settlement in the Mackenzie District to have a sizeable Eskimo population. It is also in the centre of the most important fur-trapping area in the District, muskrats being the chief catch. It has mission hospitals, day and residential schools, radio and meteorological stations, a police barracks, and the usual trading post and shops. It also boasts a cathedral, the headquarters of the Anglican Bishop of the Arctic. Although Aklavik is well within the Arctic Circle, flowers bloom and hardy vegetables flourish during the short summer.

Other settlements follow much the same pattern as the two mentioned. Fort Resolution, near the mouth of the Slave River, and Fort Simpson at the junction of the Liard with the Mackenzie are next in importance. The latter has considerable arable land in

its vicinity. Norman Wells has already been mentioned. Its population will increase and diminish with the need for oil. Like Yellowknife, it is a company town where the company operating the wells, in this case the Imperial Oil Company, tries in many ways to make life comfortable and interesting for its workers.

KEEWATIN AND THE EASTERN ARCTIC

Keewatin District, having only the barren rocks of the Canadian Shield, and much cooler summers than the Mackenzie District, holds little hope of settlement unless ores of great value are found. All of the District, except a small section in the south-west, is beyond the northern limit of tree growth. This is the land of the caribou. Here are wandering bands of Eskimos, sometimes called Caribou Eskimos, because of their complete dependence upon this animal for food, clothing and shelter. This dependence on a single animal often brings disaster to these bands, since wolves destroy large numbers of the caribou, and often in their annual migration the herds desert their accustomed route and so escape the hunters lying in wait for them. The few place names on the map of this District mark Hudson Bay trading posts, police depots, government weather stations or air fields under military supervision.

The Eastern Arctic.—This includes all the islands, large and small, which form the Arctic Archipelago. These islands are generally speaking uninhabitable, but in favoured localities there are Arctic meadows, and during the short summer flowers bloom, birds sing and insect 'music' fills the air. The scant population consists almost entirely of Eskimos who hunt, fish and trap the Arctic fox. They depend for food, clothing and fuel upon the seal, the polar bear, the white whale, the narwhal and the walrus. The chief fish caught is the Arctic char, also called sea trout or salmon.

Much might be written about the Eskimos — one of the most industrious and intelligent of all native peoples. The way in which they make use of the resources of their harsh environment has been a marvel to the white man. Today their whole way of life is being threatened. Eskimos in some places earn enough money trapping to allow them to buy motor boats and many of the white man's gadgets. Eskimos are very fond of music, and phonographs and radios are fairly common at the trading posts. The Eskimo woman is learning to use the sewing machine as easily as her menfolk manage the gasoline engine.

A Mission school and hospital, aided by the Canadian Government, is found at Pangnirtung on Baffin Island, and at various other posts missionaries do what they can to teach both children and adults to read, write and understand the basic principles of arithmetic. However not nearly enough is being done to help these people, and to protect and improve their way of life.

The Eastern Arctic Patrol, already mentioned, is one effort made by the Canadian Government to understand and help the Eskimos. For years the ship *Nascopie* carried a doctor, scientists of various kinds as well as missionaries, R.C.M.P. constables, and traders, to the northern outposts. At each stop the Eskimos were examined, their sick were treated, and supplies for the year were left behind. In 1947 the *Nascopie* was grounded on a reef off Cape Dorset in Hudson Strait, and lost. The new ship, the *C. D. Howe,* made its first voyage in the summer of 1950. It sailed from Montreal, and visited the posts on Baffin Bay and the Northern Islands, while the Hudson's Bay patrol boats served the posts on Hudson Bay and Strait. Throughout the whole Northland, more and more weather posts, radio and radar stations are being established. These must be serviced by the Arctic and Hudson Bay patrols.

No account of the Canadian Northland would be complete without paying tribute to the work of the Hudson's Bay Company, the Royal Canadian Mounted Police and the mission workers who have done such valiant work to maintain law and order in the North, and to protect the best interests of the native population.



Courtesy National Film Board

THE SUPPLY SHIP C. D. HOWE IN NORTHERN WATERS.

EXERCISES

1. List and discuss the reasons for Canada's increased interest in and development of the Northland.

2. (a) List the problems of transportation in the Northland.

   (b) What is being done to resolve these difficulties?

3. In what ways has the aeroplane affected life in the Canadian Northland region?

4. Write a note on the ways that southern Canadian culture has affected the life of the Eskimo.

5. Write a note on the ways that Eskimo culture has affected the life of Canadians from the South now living in the Northland.

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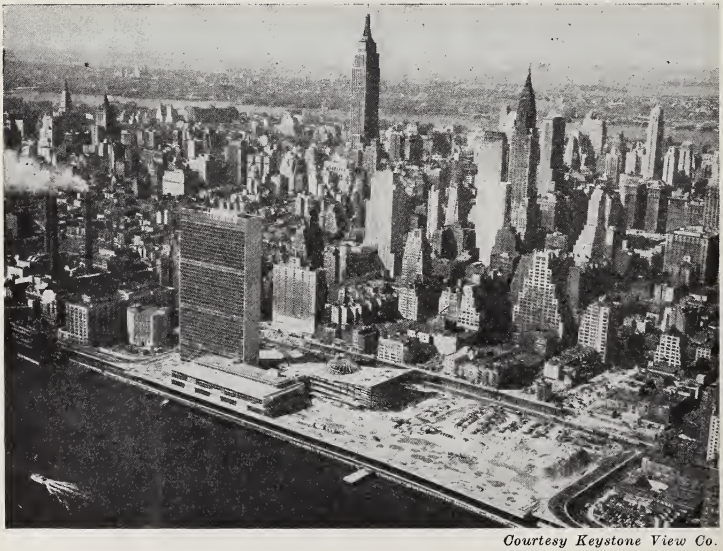
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THE UNITED STATES OF AMERICA

THE UNITED STATES IN GENERAL

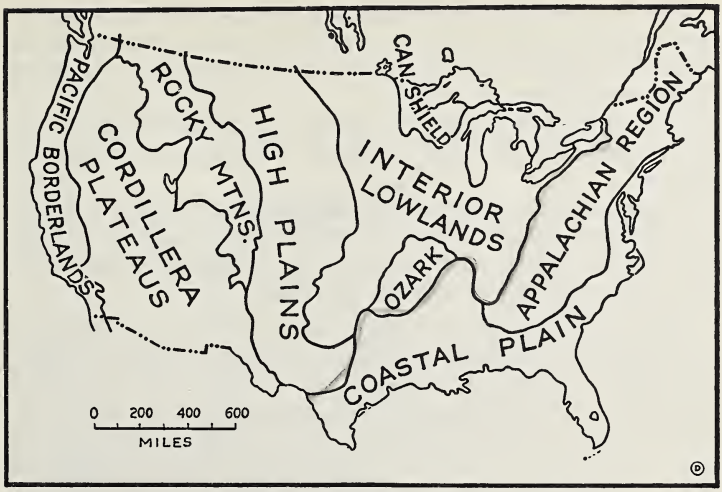
Size and population.—The United States of America consists of forty-eight states joined under a federal constitution with a capital at Washington in the District of Columbia. This great country occupying the central part of North America has an area of over three million square miles and a population approaching 160



Courtesy Keystone View Co.

NEW YORK CITY
Note the new United Nations building in the left foreground.

million. Though not the largest nor the most populous country of the world, the richness of its natural and industrial resources and the high degree of their development have combined to give the people a very high standard of living. These factors have made the United States the strongest economic power in the world today.



THE PHYSIOGRAPHIC REGIONS OF THE UNITED STATES

Agriculture.—Because of the great range of climatic conditions and the extent and variety of soils, nearly all staple crops are produced in the United States. Though cheap labour is used in some operations, farming in the United States is characterized by the use of modern machinery and large scale production methods, thus assuring for the scientific and business-like farmer an income comparable to that received by industrial workers. The many large commercial and industrial centres provide a market for a great part of the farm production, and the remainder finds a market in the world export trade.

There is no other country for which statistics are available which exceeds the United States in agricultural production. It has held first position for years in the production of corn, cotton and tobacco; it leads the world in the commercial production of numerous fruits and in the growing of many market vegetables. It is second only to the Soviet Union in the production of wheat.

Up to the present there has been unoccupied land available for new settlers, or for those who wanted to escape from crowded areas. Today there is little unoccupied land which is suitable for farming. Moreover much of the land which has been used, has been ruined by wasteful practices of farming. Fortunately the Government is now aware of the problem, and is doing all in its power to encourage wise use of the land.

Contour planting, disk ploughing, growing cover crops and strip crops, all guard against the erosive influence of wind and water. Forest conservation and tree planting will preserve or replenish natural watersheds.

New areas, once too dry for agriculture are also being brought under cultivation by vast irrigation projects and reclamation schemes.

Marginal land, not suited to agriculture, is being resown to grass for pasture, or replanted to trees. Various tree crops such as nuts or stone fruits are being grown where the slope of the land is too steep to be safe for ploughing.

Livestock.—The extensive range lands and the areas where corn is produced in abundance have made livestock raising of primary importance, particularly the raising of cattle and hogs. The development of transportation and refrigeration have aided considerably this industry and the secondary industries dependent on them. The dairy and poultry industries rely on the excellence of highways and railroads for fast transportation of perishable commodities to the large centres.

With the growth of population there have arisen certain serious problems that threaten the present rate of production of the livestock industry. Soil exhaustion and erosion and the overgrazing of range lands are among the chief of these. Government agencies have been established to point out to the farmers these dangers and provide corrective measures. Grazing restrictions are reducing the number of cattle and sheep grazing on state-owned lands, thus ensuring the permanence of that industry.

Fisheries.—The United States fisheries are also varied and extensive. The length of the seacoast, including islands, is 21,862 miles. Conservation here is also essential to protect the employment of over 200,000 people in the fishing industry. Commissions composed of Canadian and United States representatives see to it that the resources of the fishing grounds adjacent to the United States-Canadian borders are shared fairly.

The process of quick freezing has revolutionized the fishing industry, and quick-freezing plants are now found at most ports where fishing fleets come in.

Mining.—One of the reasons for the economic leadership of the United States is the extent and variety of minerals found within her borders. Iron ore, close to rich coal-fields and cheap transportation, accounts for the United States' supremacy in the iron and steel industry. Base metal mines producing copper, lead

and zinc have been well developed and supply a large part of the country's needs. This nation is also one of the world's leading producers of gold and silver and other metals such as vanadium and molybdenum, used in making very durable steel. Because of the abundance of water power and well developed transport facilities, the United States has also become the leading producer of aluminum.

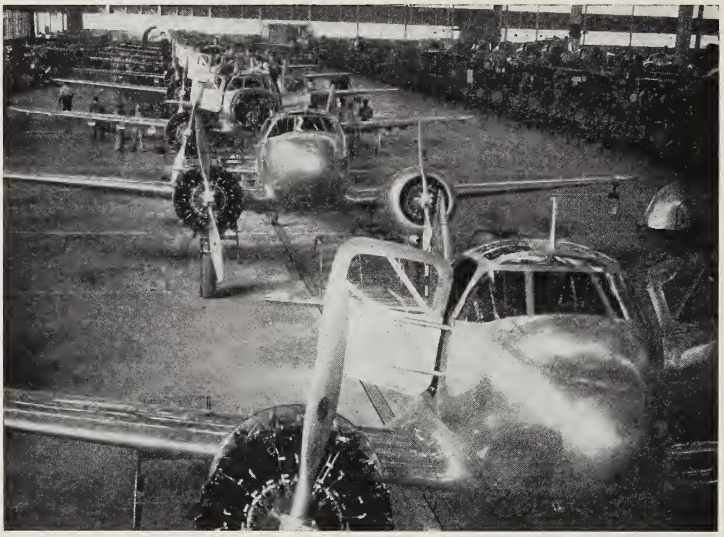
Rich coal fields with seams near the surface give this country a great advantage over other coal producers whose costs are increasing owing to the depth at which they must mine. As a producer of petroleum, the United States has no equal, but some claim that the reserves are diminishing and consumption increasing. Here is another problem of growing concern to those who are conscious of the need for conservation of resources. Oil is being sought throughout the country and new wells are constantly being brought into production. Some of the most valuable of these are around the shores of the Gulf of Mexico.

Other minerals, too, are produced in quantities, but the great industrial output of mechanical goods makes it necessary to import such minerals as tin, nickel, vanadium and platinum.

The United States, together with Great Britain and Canada, has led the way in atomic research. Uranium, the raw material obtained from pitchblende ore is imported from Canada and the Belgian Congo. At Oak Ridge the Government has established a plant for atomic research.

Manufacturing.—With abundant coal and water power resources and primary products close by or readily accessible, it is not surprising that the United States is one of the leading industrial nations of the world. Manufacturing has tended to be centralized in the eastern states, but gradually factories are growing up in other areas. The steel industry is still centred near the coal-fields, or where coal meets iron at a break in transportation, and those industries dependent upon it are clustered in the same vicinity. But automobile assembly plants, clothing manufacturing estalishments, and food processing plants are, to some extent, being established where the products can be marketed readily in the large commercial centres of the plains and west coast regions. However, in New York, Pennsylvania, Illinois and Ohio, about 40 per cent of the United States manufactured articles are produced.

Transportation.—The United States is a rich new country with highly developed industries and a large population. Consequently, the people can afford to support good roads, railways, and air lines.



Courtesy Keystone View Co.

A close-up of a long assembly line in a large aeroplane plant.

The United States has six times the railroad mileage of Canada but twelve times the population to pay for it. The owners of the 32 million motor vehicles can do much more to provide good highways and roads than can the owners of two million motor cars in Canada. The huge tonnage of commerce carried over the inland waterways system makes possible projects in the United States that are now impossible in Canada with its smaller population and commerce. In a recent year the Great Lakes inland waterways in the United States carried 17 million tons of foreign commerce and 208 million tons of domestic commerce.

Commerce.—The United States is one of the chief producers of a great variety of goods, and a land where specialization has been highly developed, hence commerce is of great importance. The great food producing areas of the middle west trade their products for the industrial output of the eastern and north-eastern states. The mild climate of Florida, Texas, and California makes early fruits and vegetables available to the peoples in the colder northern states. It has been said that one of the reasons for the high standard of living in the United States is that it is one of the largest and most populous free trade areas in the world. Over 90 per cent of the total trade is domestic trade. The splendid

system of highways, railroads, waterways, and a single financial system make possible the rapid interchange of commodities between people in all areas of the union. However, the United States does require some products which she cannot produce, such as raw rubber, tin, nickel, raw silk, coffee, jute and hides.

Foreign markets, too, are needed to dispose of the surplus goods produced in her factories. But less fortunate nations cannot afford to buy these goods unless they in turn can sell their goods in the United States. In the past there has been a high tariff, or import duty, on most manufactured goods from abroad, which has made it impossible for these goods to compete in price with those made in the United States.

During and after the second World War, the United States made loans and gifts to other nations to enable them to buy the goods which they so badly needed and which the United States wanted to sell. This has made the United States the world's chief creditor nation. It is clear that this policy cannot be continued indefinitely. Though some of the world's best brains are trying to find a solution to the problem, it would seem that those nations that wish to sell, must be ready to buy, if international trade is ever to regain its normal flow.

With this brief discussion of the United States in general, let us turn to a study of the country in more detail. The Appalachians and the Western Cordillera divide the country into three well-marked regions: the Atlantic coastal plain, the central plains of the Mississippi basin, and the Cordillera region. Each of these will be discussed in detail.

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THE EASTERN COASTLANDS REGION

We have already met the outliers of the Appalachian highland in Newfoundland and in the maritime provinces of Canada. These mountains extend from Gaspé peninsula to Georgia, where they gradually merge into the Gulf coastal plain. They are much lower than the Cordillera, yet there are peaks rising to a height of 6,000 feet. Generally speaking, the Appalachians consist of a series of parallel ridges extending toward the south-west. In the north the Notre Dame ridge in Quebec, the White Mountains of New Hampshire, and the Green Mountains of Vermont combine to form a water-parting between the St. Lawrence and the Atlantic. South of these are the Catskill Mountains of New York. From the St. Croix to the Hudson River low ridges run out to the sea. This section has been heavily glaciated, and the streams are short with many waterfalls.

The Hudson River and its tributary the Mohawk give the only easy gradient through the Appalachians from the Atlantic to the Great Lakes and the central plains of the continent. From New Jersey to Florida the coastal plain widens to a width of 200 miles.

THE NEW ENGLAND STATES

The New England states occupy an area a little larger than that of the maritime provinces of Canada, yet their population is eight times as great.

The whole of New England was once covered with a mixed forest of softwood and hardwood trees. The early settlements were near the sea coast, but as the population increased the interior valleys were cleared of their forest growth. Lumbering and mixed farming were then the chief industries, and are still of importance through Maine, New Hampshire, and Vermont. However, as early as 1830 the people of New England began to hear the call of the west, and during the next seventy years thousands of the upland farms were abandoned in favour of the fertile lands of the Ohio and Mississippi valleys. In fact, the acreage under

crop at the present time is actually less than the area under cultivation a hundred years ago, and does not now support the present population. Large quantities of foodstuffs are brought in by rail.

New England is a hard land, with thin soils on the mountain slopes, and with greater extremes of climate than are found in the Maritimes. The best soils lie in the river valleys, between the granite ridges which cover so much of the country. Apples are grown, as in Nova Scotia. The Aroostook valley of Maine is noted for the production of potatoes, which are shipped south to the large industrial centres. Hay, oats, fodder corn, and vegetables are the main crops of this mixed-farming region. The Connecticut valley is noted for a fine grade of tobacco, and for onions and other market garden produce. Cranberries raised on Cape Cod and on the mainland nearby are another specialized crop. There are about 900,000 milch cows in New England, but cream is imported from Quebec in order to supply the demand. Vermont has half the dairy herds in New England. These are maintained on the fertile soils east of the Lake Champlain valley, a part of the St. Lawrence lowlands.

Gloucester and Boston are the principal fishing centres, and their boats visit the Grand Banks of Newfoundland. The fishing-grounds which lie off the coast from Maine to Long Island are well and thoroughly fished, and there is a ready market for all that can be caught. Cod, halibut, herring, and mackerel are landed in fairly large quantities. There is some lobstering along the Maine coast, but the bulk of the supply comes from New Brunswick and Nova Scotia.

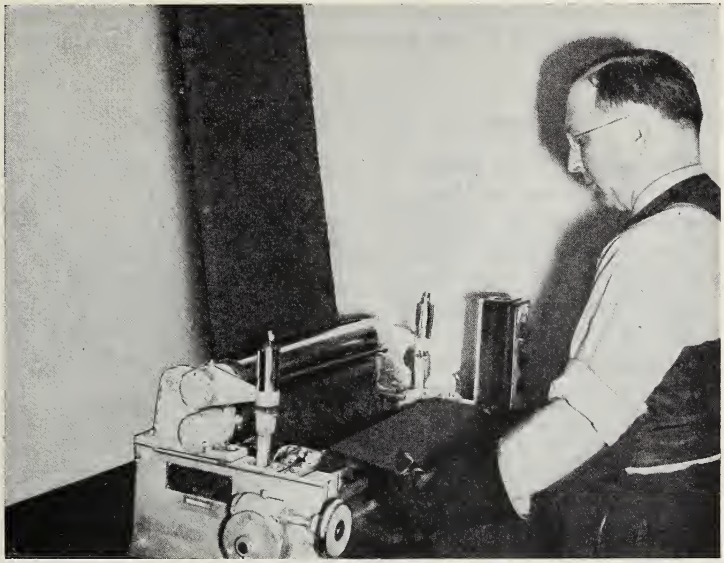
Manufacturing.—More than half the people in New England today live in cities and towns and are engaged in manufacturing. Dire necessity forced this upon those who wished to retain their homes and compete with more favourable conditions in the Ohio valley and other western lands. The surface of New England is dotted with glacial lakes, which provide storage reservoirs for the melting snows and give a fairly steady run-off to the streams. The rivers coming down from the hills have many falls, and in early times mills run by water-power were built at favourable locations. Now the old mill sites have been converted into hydro-electric stations and 1,400,000 horse-power is in use. In the absence of coal-beds it may be said that the tumbling waters of New England laid the foundation of the present large manufacturing industry. Today the hydro-electric power is not sufficient for industrial needs and must be supplemented by power derived from

coal. Coal is brought in by vessel from the Delaware, and numerous harbours along the coast help in its distribution.

The New England towns began manufacturing in a small way after the Revolutionary War of 1776-83. As the United States grew in population, and pushed westward to the Pacific, the factories in New England were enlarged to supply the demand, and gradually a large number of skilled workmen were to be found throughout the whole section. When new factories were needed, the managers located them where there was a supply of skilled labour. In this way an industry, once established, drew other plants of the same type to its immediate vicinity. This human factor will explain many of the concentrations of industry elsewhere in the world. We should also note that the factory owner desires to operate where there are supplies of raw material at hand ready to feed his machines. A ship bringing raw cotton for two cotton mills can bring more for a third mill or a fourth. Warehouse facilities are provided, and stocks of material are kept on hand. There is little danger of shortage, and freight rates are lower for full cargoes than for partial loads.

The manufacturing of New England, because of its geographic location, deals largely in small finished articles which will stand a long railway haul to the interior of the United States. Watches, firearms, boots, and shoes are examples of this trend. It is also noteworthy that the factories which are increasing so rapidly in the southern Appalachians produce the coarser fabrics. In this way, distance from the source of supply, lack of coal, and distance from the market may be overcome.

For a long time the textile industry of the United States was located in New England. Lawrence, Lowell, Fall River, Nashua and Manchester were noted cotton towns. Today, although cotton is still manufactured in the New England states, the chief centre of cotton production is in the southern states, particularly in the southern foothills of the Appalachians. These southern cotton mills are nearer to the cotton fields, have cheaper power, and cheaper labour. They also have more modern machinery and avoid the heavy taxes paid by mills in the more populous centres in New England. Where the older mills have been able to maintain production, they have been forced to specialize in some type of 'fancy goods' requiring fewer, but more skilled workers, and bringing a higher price. Cotton and wool are manufactured in New Bedford, Pawtucket, and Providence. Danbury specializes in the manufacture of felt hats made from the fur of Australian rabbits.



Courtesy Wheeler Newspaper Syndicate

Cotton fabric being treated for mildew-prevention in a New Orleans factory.

New England leads all other districts of the United States in making shoes. Over three hundred shoe factories are scattered through the Boston region, chiefly because Boston is the most important port of entry for hides and leather in the country. Brockton to the south of Boston, Lynn to the east, and Haverhill to the north are the chief centres of this industry.

New Britain, in Connecticut, is noted for its production of hardware of every kind: tools, kitchen utensils, stoves, and furnaces. Waterbury manufactures watches as does Waltham in Massachusetts, while Springfield is noted for its production of firearms. These are only a few of the multitude of manufactured articles produced in New England. The most remarkable thing about the region is the diversity of its products.

Boston (2,500,000) ranks next to New York as a commercial port. More than twenty manufacturing centres export their products through this city. Yet Botson is more important still as an importing centre. Thousands of tons of cotton, wool, leather, iron and many other raw materials come to the warehouses of this great New England centre. It is the leading leather and wool market of the United States, and the centre of the largest textile and shoe manufacturing area in the world. For many years, Boston has

been the leading educational centre of the north-eastern United States. It is almost as well-known for its libraries as for Harvard University.

NEW YORK AND THE HUDSON-MOHAWK GAP

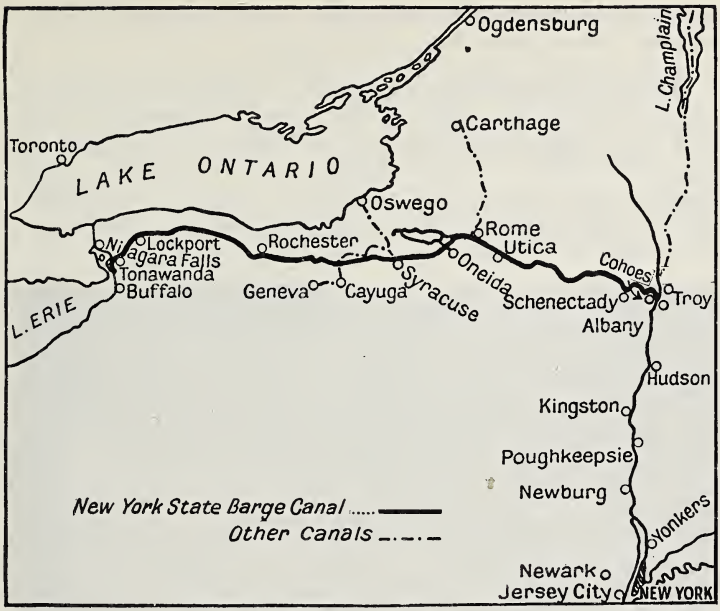


The great city of North America is situated on Manhattan Island at the mouth of the Hudson River. The city grew rapidly after the completion of the Erie Canal in 1825. Since then Manhattan Island has become crowded, and towns have sprung up at Brooklyn on Long Island, and on either side of the river mouth.

Strategic position.—This great concentration of commerce and industry within a small area is the result of the wonderful highway provided by the Hudson River to Albany, and by the New York State Barge Canal, via the Mohawk valley, to the Great Lakes above Niagara Falls. It is the only low pass through the Appalachians. Today, railways with as many as four parallel tracks follow the river route to Buffalo, and westward to Chicago and the great plains of the continent.

New York, at the Atlantic end of this trade route, is a great import-export centre. In its huge office buildings are housed the head offices of trading companies, railway companies, and steamship lines. It is the financial centre of the United States. Three hundred and fifty miles of docks, lying side by side like teeth in a comb, border the shore from Brooklyn to the upper end of Manhattan Island. The great Brooklyn suspension bridge, which connects New York with Long Island, has been considered one of the wonders of the world. A tunnel now leads under the river to Jersey City, and high-level steel bridges cross the Harlem River to the Bronx.

Grain from the Great Lakes, flour, meat, lumber, and many other products seeking an outlet for export come from the interior



CANAL MAP OF THE STATE OF NEW YORK.

of the continent, by way of the railroads and the canal to New York. From Europe come manufactured articles, such as cloth, machinery, and articles of fine workmanship. Raw products, such as wool, oils, silk, rubber, cabinet woods, and spices, are brought in to New York and stored in great warehouses. The wholesale houses sell in smaller quantities to the manufacturer and retailer.

At the gate of this great highway of trade it is natural that many factories find a location. In New York and adjacent districts every type of manufactured article may be found, from jewellery and toys to heavy machinery and steamships. This is the greatest manufacturing city on the continent, and the largest in population.

Clothing industry.—New York City and environs are the chief centre of the clothing industry in the United States. In the factory buildings many thousands of people are employed. Some of the workers cut out the garments, others run up the seams, some make sleeves, some do buttonholes. Each part is standardized, and no one employee completes the whole garment. In this way each worker becomes proficient in doing one small part, and the gar-

ments are made much more cheaply. These garments are sent to stores in every part of the United States.

Printing and publishing.—A number of printing and publishing firms have their head offices in New York. In a recent year there were 2,172 periodical publications, of which 192 were published daily, 944 weekly, 66 semi-monthly, and 799 monthly, all in English. There were also 33 published in Italian, 21 in German, 20 in Spanish dialects. The printing and binding of books adds enormously to the importance of this industry.



Courtesy Wheeler Newspaper Syndicate

The skyscrapers of Manhattan's financial district tower above the last of New York City's elevated railroads.

Silk.—At Paterson, New Jersey, are some of the largest silk mills in the world. Before the second World War disrupted Oriental trade, the raw silk was brought across the continent from Seattle and Vancouver by express trains, while some came through the Panama Canal. Some went to Paterson where it was woven into beautiful fabrics. Some was warehoused in New York and sold to small mills elsewhere. With the loss of much of the raw silk from the east, these factories have used other textiles such as cotton and wool, and synthetic fibres such as rayon, nylon and spun glass.

On Manhattan Island, and within New York proper, only specialized industries are carried on. These use a small amount of raw material, require skilled workers and little space for factory or workrooms. These are 'clean industries', whose end-product has a high market value. Such are bakery products, jewellry, furs, buttons, as well as the clothing, books and magazines already mentioned.

The heavier industries using bulky raw products and requiring large factory space are situated in the towns and cities on the fringes of New York proper.

Industrial cities.—Cities have grown up along the Hudson and Mohawk, because a location on the main trade artery of the United States is almost as good as one at the mouth of the Hudson itself. They have been likened to 'beads on a string'. Knitting mills are found at every large town along the Mohawk River. Troy specializes in the manufacture of collars and shirts. Schenectady is noted for its machine shops, and for the making of locomotives, cars, and electrical machinery. Gloves are made at Johnstown and Gloversville. Syracuse is a very important commercial and manufacturing centre. Among its numerous manufactures are included machine-shop products, farm tools, furniture, and numerous products of the salt and chemical industries. Rochester is the chief world centre for the manufacture of cameras and photographic materials.

Albany, 250 miles up-river, but able to accomodate sea-going vessels in its deep harbour, is the capital of New York State. It is centrally located at the junction of trade routes northwards to Lake Champlain, and westwards to Buffalo. This excellent situation has led to the manufacture of such varied articles as toys, billiard balls, stoves, gas-meters, and adhesive paste.

The constant flow of raw products through this funnel of trade has made it one of the great manufacturing districts of the continent. Coal comes from Pennsylvania, there is considerable local water-power, and power is brought in from Niagara. Fuel oil is brought by pipeline from the central and the Southern States.

Buffalo (860,000), at the end of the canal on Lake Erie, developed into a great city through the handling of bulky articles coming down the Great Lakes for transfer to New York. Wheat oats, corn, iron, and lumber from the Great Lakes region pass through Buffalo on their way to tide-water at New York. Manufactured products from the New York and Hudson factories pass through Buffalo on their way westward. This flow of raw material

has led to manufacturing in Buffalo itself. Flour-milling, meat-packing, lumber mills, and car shops are among the important industries. Petroleum is refined, and copper and iron ores are smelted on a large scale.

Agriculture.—Ten million people in and around New York dependent upon commerce and industry for their living, create a strong demand for foodstuffs. Certain foods will not stand a long haul, and should be grown locally, if possible. It is quite natural, then, to find that the annual production of milk in New York State amounts to 887,097,000 gallons. Altogether 59% of the total land area of the state, or 18,000,000 acres, is owned by the farmers; 8,400,000 acres are under crop of some kind. The rest is pasture and woodland. Arable land is at a premium in the State of New York. This condition is still further accentuated by the presence of the Appalachian and Adirondack highlands which occupy a large part of the state area.

NEW JERSEY TO MARYLAND

South of the Hudson River, the Appalachian Mountains are bordered by a low coastal plain, which varies in width from 100 miles to 300 miles. Between the plain and the mountains the land rises rapidly to the Piedmont plateau, composed of hard crystalline rocks, covered for the most part with clay soils. West of the Piedmont and the Blue Ridge mountains, there is a depression known as the great Appalachian valley. It extends from Alabama northwards to the Hudson Valley and Lake Champlain. The western side of the valley rises steeply to the abrupt slope of the Alleghany Front (3,000 feet). Beyond this the Alleghany plateau, with an average width of 125 miles, slopes gradually to the Ohio and Mississippi basins.

How cities help agriculture.—The larger part of the coastal plain in New Jersey is composed of fine sand, and is still covered with a pine forest, from which, however, the best trees have been taken. The small streams which flow down from the Piedmont enter the sea through shallow bays and lagoons which are partially enclosed by barrier sand beaches. There is no large city along the 200 miles of New Jersey coastline. Atlantic City is a summer resort for the teeming millions of the New York area, and has no other commerce or manufacturing industry. However, these same hungry millions have made it possible for the farmers of New Jersey to produce vegetables for nearby markets. Truck garden-

ing is the important agricultural industry. Thousands of acres are most intensely cultivated, and are growing lettuce, cabbage, cauliflower, peas, beans, sweet corn, etc. The sandy soil drains quickly, it warms readily, and plants mature more quickly than on the heavier soils of New York and New England. The adjacent city market is so valuable that it pays the New Jersey gardener to import commercial fertilizers to keep his sandy soil in high fertility. Cold frames, hot-beds, and greenhouses prolong the growing season, and the New Jersey truck gardener is able to supply fresh vegetables to the manufacturing centres of the lower Hudson during a large part of each year. The point to be remembered is that these sandy soils would be of no value, if it were not for the urban markets close at hand. Pine forest covers that portion of the coastal plain which is further removed from the markets.

The Delaware and Susquehanna Rivers which rise in the Alleghany plateau wind their way southwards across the Piedmont plateau, to the large tidal estuaries of Delaware and Chesapeake bays. The early Quaker emigrants, under William Penn, took advantage of this fact when they founded the city of Philadelphia, ninety miles up the Delaware from the sea.

Philadelphia.—(3,370,000). Until 1830, the population of Philadelphia was equal to that of New York. But the completion of the Erie Canal gave a cheap water route through the mountains to the heart of the continent, and the last century has seen Philadelphia out-distanced by its northern rival. Today Philadelphia is the largest city of Pennsylvania and the fourth largest city in the United States.

Since Philadelphia has no low gradient across the Alleghany plateau, other advantages account for the large numbers within its boundaries. The city is connected with New York by a number of parallel railway lines. Small factory towns and large factory cities are located along this traffic highway. The Schuylkill and Lackawanna valleys lead westwards to the coal-fields, and the coal is delivered at the Delaware by means of barge, canal, and railway. The Delaware is tidal to and beyond Philadelphia, ninety miles from the sea, and accommodates large ships. Raw materials are as easily assembled at Philadelphia as at New York.

Philadelphia is one of the leading shipbuilding centres along the Atlantic coast. The manufacture of locomotives and of saws and tools also depends upon the coal and iron from western Pennsylvania. There are hosiery and knitting mills, and carpets are made. Sugar refineries constitute one of the leading industries in point of value of the finished product. The tanning of leather

is another important industry and is dependent upon the oak forests that cover the Appalachian ridges, tannic acid being extracted from the oak bark. Printing and publishing is another important industry and ranks first in the value of goods produced. Philadelphia has sixteen miles of waterfrontage along the Delaware river with five miles of docks. The value of exports and imports amount in some years to over 300 million dollars.

Chester, a few miles down stream from Philadelphia, has rolling mills and steel works. Ships and locomotives are built here. There are also large textile mills, making cotton and worsted goods and artificial silk.

Wilmington is eighteen miles below Chester, and has a situation almost as good for trade as that of Philadelphia. For this reason it is growing rapidly, and specializes in the manufacture of gunpowder, dynamite and chemicals. There are also large factories making machinery and cars.

Camden is a large city across the river from Philadelphia. It is the centre for numerous railways which diverge throughout New Jersey, and ferry-boats cross the river to Philadelphia on the west bank. Tidal flats extend back from Camden for some six miles in terrace formation. The soils consist of sand, sandy clay, and marl, making this section a great truck garden. Such early vegetables as asparagus, sweet potatoes, peppers, cabbage, and corn are grown. There are numerous canning factories to utilize the excess which the city market cannot absorb. As in Philadelphia, so in Camden, tanning of leather is an important industry. The city also contains large phonograph factories, and refines copper ore; the large cotton and worsted mills employ many operatives.

Trenton, at the bend of the Delaware, is the capital of New Jersey and an important industrial centre on the great Philadelphia-New York highway. Raw rubber is imported in large quantities and made into tires. The city is also noted for its pottery, once made from local clays, but now largely dependent upon imported clays. The position of Trenton, midway between the two large cities New York and Philadelphia, is an important factor in its growth.

East Orange, Newark, Elizabeth, Weehawken, Hoboken, Jersey City, and Bayonne comprise a constellation of industrial centres south of the Hudson and at one end of the trade route to the Delaware. They are also near the shipping centre, New York. These cities are all within a twenty-mile radius of Newark and the mouth of the Hudson River.

The port of Elizabeth is the great centre for the manufacture of sewing machines. Vegetable oils are imported and refined on a large scale. There are large shipyards at Bayonne and Jersey City as well as at Elizabeth. The immense refineries of the Standard Oil Company are located at Elizabeth and Bayonne. Pipelines from the Pennsylvania oil-field, and from mid-continent fields, bring millions of gallons of crude oil to this seaport. The refineries at Elizabeth cover 800 acres, and separate the petroleum into many valuable products. Crude oil from foreign fields is landed at Bayonne and refined products are exported. The petroleum refineries of New Jersey have an output valued at nearly $214,000,000, although not a drop of crude oil is produced in that state. New Jersey ranks fourth among the states refining petroleum.

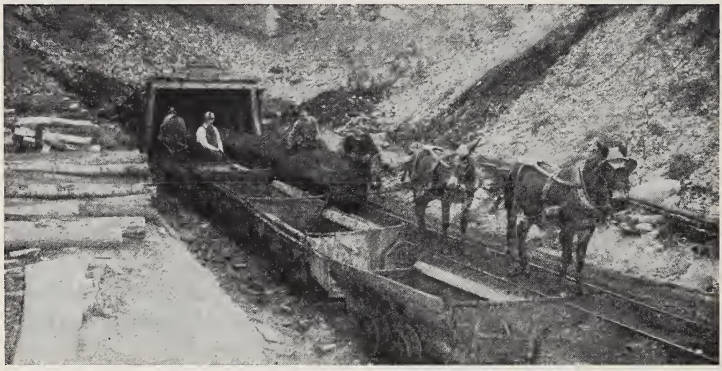
Jersey City and Orange (near Newark) are noted for their large sugar refineries, which handle both cane and beet sugar. In all these cities there are foundries, machine shops, and textile factories. Newark is the largest of the group in population and in diversity of manufactures. Copper ores are smelted and refined on a large scale, most of the raw ores being brought from Chile, Peru, and Mexico, but some come from the United States section of the Cordillera. Gold, silver, platinum, nickel, lead, and zinc are also refined, and it is not surprising to learn that there are factories which make jewellery. The tanning of leather is still another important occupation, as at Philadelphia and Camden. Much of this leather is used locally and in New York, while some is sent to the New England shoe factories. Newark is an important centre for the manufacture of felt hats. The making of rubber goods, of phonograph and radio sets (at East Orange) completes a rather remarkable list of activities.

The above account shows the remarkable concentration of raw material at New York, and its utilization in factory centres both within and without the confines of the great metropolis. From Wilmington to New York there is the greatest amount and variety of manufacturing to be found on this continent. Five railway lines bring coal from the Appalachians to the factories of this belt, and supply power which is necessary for the manufacturing plants. The Hudson-Mohawk route provides the only low gradient to the interior of the continent, south of the St. Lawrence, and steamships bring in and carry away varied articles of trade, by way of the New York and Newark bays on the one hand, and by way of Delaware Bay and River on the other. There could be no more complete

example of the effect of the meeting of trade routes, and their utilization by the great manufacturing interests.

THE APPALACHIAN COAL-FIELD

The Appalachian coal-field extends from the northern border of Pennsylvania to the south-west, 800 miles, to central Alabama. It is 150 miles wide near the northern end, but tapers gradually to a width of twenty miles in Tennessee. It expands to a width of eighty miles in Alabama. The geological survey of the United States reports that it embraces portions of nine states, and has a total estimated area of 70,000 square miles. This is by far the most important of the bituminous coal-fields of the country in its extent, in the quality of the coal, in the number and thickness of the workable beds, and in the importance and accessibility of its markets. The northern part of the field lies in the states of Pennsylvania, Maryland, West Virginia, and Ohio.



Courtesy Wheeler Newspaper Syndicate

Mules pull cars of coal out of the Linge mine in Clearfield, Pa.

The Pittsburgh bed is the most valuable in quality, thickness and uniformity. It gives an excellent domestic and steam fuel, and is mined in large pieces which withstand the rough usage of long shipment and frequent rehandling. The rivers and streams which have cut their way through the coal-field have exposed the seams, and most of the mines drift in along the vein, and deliver the coal to the railways and river barges in the valley by means of gravity. This makes for ease in mining and a relatively low cost of production.

The anthracite beds of eastern Pennsylvania are unique in size and in the quality of the coal. This is the only important

anthracite deposit now being worked in North America. From an area of about 480 square miles, 60,000,000 tons of anthracite are mined annually. This industry is centred mainly in the Wyoming valley from Wilkes-Barre, through Scranton, and on to Carbondale. The anthracite beds are badly faulted and bent, and in some places the coal-seam lies at a very steep angle. This adds to the cost of production, hence anthracite always costs more than bituminous coal.

Because of the increased uses of oil and natural gas, the production of both bituminous and anthracite coal is decreasing.

Manufacturing in the coal district.—Although farther inland than those of the coastal plain, cities containing factories and large industrial establishments have grown up on the coal-beds as in the Manchester and Leeds district of England. At Scranton there are iron foundries, and mining machinery and locomotives are made. Textile mills produce laces, cotton goods, and woollens. The foundries and the machine shops employ men for the heavy work; the textile factories employ women. This same diversity of industry is found throughout the district. Wilkes-Barre has plants which produce forged axles and wire rope and also factories making silk and lace goods. At Allentown, in the Lehigh valley, there are smelters, rolling mills, and cement plants; also knitting mills, lace mills, and shoe factories. Bethlehem, a few miles away, is noted for its production of steel rails, armour plate, castings, and machinery of many kinds. The ribbon factories and silk mills would seem, at first glance, to be somewhat out of place in such an atmosphere. Similar conditions are found at Hazleton, Steelton, Norristown and Harrisburg. The grouping of factories within a city area so as to employ both men and women explains many seeming oddities in the manufacturing world of to-day.

Pittsburgh.—(2,100,000) The iron city of the United States is situated at the junction of the Alleghany and Monongahela Rivers. Three railways cross the Appalachians and converge at Pittsburgh: one from New York via Newark, Allentown, and Wilkes-Barre; one from Philadelphia via Reading, Harrisburg, and Altoona; the third from Washington via the Potomac valley. Traffic lines from Pittsburgh run south up the Monongahela and north up the Alleghany valley to Lake Erie, and westwards by the Ohio to the interior of the continent. The city can and does draw its supply of iron ore from distant areas, while the product of its furnaces and mills reaches every large industrial centre in the United States. It has been said that Connellsville coke and Ohio limestone have made



Courtesy Wheeler Newspaper Syndicate

PITTSBURGH AT NIGHT.

Pittsburgh the great centre of the iron industry. If we add to this statement, the ease with which iron ore from the Minnesota Ranges may be brought by vessel to Lake Erie, the meeting of the iron ore and coke at Pittsburgh is better understood. There is also much natural gas piped into Pittsburgh, where large quantities are used in the homes of the people. Large beds of sand in the vicinity of the city plus the abundance of natural gas have made Pittsburgh noted for the production of glass.

The state of Pennsylvania has an area of 44,832 square miles, with a total population of over 10,000,000.

CHESAPEAKE BAY TO FLORIDA

The Delaware-Maryland Peninsula and Chesapeake Bay.—Chesapeake Bay is a submerged estuary leading from the sea through the coastal plain to the border of the Piedmont plateau. Ocean vessels follow up the bay to Baltimore and up the Potomac nearly to Washington. These two cities, with Norfolk near the entrance, control the trade of the Chesapeake Bay region.

Agriculture.—The peninsula between Chesapeake and Delaware bays may be considered a great truck-garden area. The spring and summer season coming two weeks earlier here than in northern New Jersey and Long Island, enables the grower to invade the northern markets at a season of good prices. Tomatoes lead in acreage and in yield; sweet corn is second in importance, followed by cabbage and melons. Peas, beans, and strawberries are also grown on a large scale. Canneries take care of the surplus

product. Apples and peaches are grown on the higher lands which rise to the Piedmont. Through this district there are many small towns, but no large cities. Truck gardening and farming do not result in large urban centres; cities are the makers of things.

Baltimore (1,300,000) is the great canning centre in the United States, because of the cheap water transport for vegetables and fruit from the Chesapeake Bay lands. It is also a large distributing centre for the merchants who serve the rural area. The city's trade includes markets as far south as Richmond and Charleston. Baltimore is the southern link in the chain of manufacturing centres which stretch from Boston to Wilmington. Garment making is another industry of Baltimore, and the city resembles New York in this respect. Large steel works near the city smelt ore from Cuba; some of this steel is used in ship-building. Fertilizers are made on a large scale to supply the needs of the truck gardeners. Baltimore exports grain, some of which comes from Buffalo. There are large flour mills, and tobacco factories utilize the leaf grown in nearby districts. In 1940, Baltimore was the third port in the United States in total waterborne commerce, and almost 27 million tons of freight were transported through its harbours.

The fisheries of Delaware and Chesapeake bays are exceptionally valuable in providing a cheap form of food for the rather thickly-populated adjacent farming areas. Herring come into these bays in countless thousands, and it has long been the custom for the people to salt down a year's supply for the family. At five dollars a thousand for herring the poorer labouring class is able to supplement a vegetable diet with the necessary protein. A negro workman's lunch of salt herring and some cold corn-bread may not be very appetizing but it does reduce the cost of living.

Oysters are another valuable sea crop. The thousands of square miles of protected, shelving shores are divided into oyster farms, which the owners cultivate just as truly as others cultivate the land. There is some stealing or oyster piracy, and conservation measures have been adopted to maintain the supply, which amounts to many millions of dollars in value each year.

Washington, D.C. (1,200,000) is the capital of the United States. It is situated on the Potomac River at the head of navigation, and at a point where the river tumbles down over the Piedmont edge to the plain below. Here we find the great federal administrative buildings, the Capitol, the White House, and many others. Of the 663,901 inhabitants, government officials constitute about one quarter of the total. At one time, Washington could have been



Courtesy Keystone View Co.

THE CAPITOL BUILDING AT WASHINGTON, D.C.

called a city without an industry other than that of politics. Today, however, printing plants, bakeries, slaughter houses and planing mills are among the chief manufactures carried on within sight of the Capitol. The District of Columbia, with an area of only 61 square miles, within which the city has developed, is under the control of the Federal Government.

Norfolk is situated at the gate to the Chesapeake. It is the only large city on the edge of the coastal plain, south of New York, and there is no large centre of population farther south until we come to Wilmington in North Carolina. The tidal estuary of the James River, Hampton Roads, provides Norfolk with a fine harbour, which is said to be capable of sheltering all the ships of the world with room to spare. One of the largest naval stations in the United States is found here. Coal is brought down from the Virginia fields for export, and these same railways connect with the Ohio River at Huntingdon, so that there is connection with the interior plains. Much of the freight originating in North Carolina and Virginia is now exported through Norfolk.

Portsmouth and Newport News are clustered about Norfolk as Jersey City and Brooklyn are about New York. Newport News is noted for its shipbuilding plants. Portsmouth and Norfolk are

warehouse centres for tobacco and export many tons of this commodity.

On the lands west of Norfolk several counties specialize in the growing of peanuts. The climate and the soil have been found to be well adapted to the growth of this vine, and Virginia peanuts are of excellent quality. It seems strange to find such a crop growing in the valley of the James River within sight of the Jamestown which in 1607 was the first English settlement on these shores. In those days, tobacco was the big money crop. But tobacco is a soil robber, and after centuries of use and abuse the soil of the plantations became impoverished, and thousands of acres grew up to pine and brush. Now these lands are being reclaimed with new owners and new methods.

The land of tobacco and cotton.—South of the Potomac River we enter upon a region of long growing season and little frost. In Virginia and North Carolina, tobacco is grown on a large scale in the Appalachian valleys, in the Piedmont plateau, and to some extent upon the better soils of the coastal plain. In many sections of the Piedmont, the loose loamy soil has been scoured into deep gullies owing to the poor methods of farming, the ploughing of slopes which should be kept in pasture or forest, and the prevalence of winter rains on a frost-free soil. The planting of tobacco in small patches of a few acres is the general custom, with here and there fields of ten to twenty acres. The general appearance of large sections of the country-side is rather dismal, the farmers devoting all their time and attention to the tobacco patch, and letting the rest of the farm grow up in bush. Even under these conditions, the production from this area amounts to nearly 900,000,000 pounds of tobacco annually.

Much negro labour is employed, as the negro forms a large part of the population throughout these states. Tobacco culture requires much hand labour in weeding around the young plants, picking off the side shoots while the plant is growing, and cutting off the flowers so that the plant will not seed. Then the stalks must be cut and split by hand, and hung on poles to dry in the curing shed.

Durham, Winston-Salem, and Lynchburg have large factories for the manufacture of pipe tobacco, but Richmond is the largest centre.

Richmond is situated at the falls formed by the James River, where it passes from the hard, ancient rocks of the Piedmont onto the young sandy soils of the coastal plain. Like all the other cities which have grown up at the edge of the Piedmont, on

what is known as the fall line, Richmond has hydro-electric power to use in its factories. In addition to its tobacco factories it has paper mills and sugar refineries. Power is developed from the falls and rapids of the James River above the city, while below, fairly large boats take the products to Norfolk for export. Coal is also available in the Appalachians to the west, and Richmond dominates the manufactures of the southern plain as Baltimore does those of the Chesapeake basin.

Tobacco is also grown on the western slope of the Appalachian plateau in Tennessee and Kentucky, states which parallel North Carolina and Virginia on the east. Kentucky, producing over 500,000,000 lbs., leads all other states by a large margin.

Cotton.—The southern part of the United States from Carolina to Texas is known as the cotton belt. Cotton thrives best below the 36th parallel, and it requires at least two hundred frost-free days in which to mature. A dry autumn with less than ten inches of rain is a second important requirement. Within such bounds the growing of cotton is a possibility and may be made a success. Study of certain districts in the south will show that two crops overlap and that cotton is grown side by side with tobacco and corn. The growing of cotton is similar to that of tobacco. It is grown by individual farmers in small patches of two to five acres. Every one helps with the hoeing and picking. Of course, there are large plantations with several hundred acres under cotton at one time, but the number of small-lot farmers is surprising.

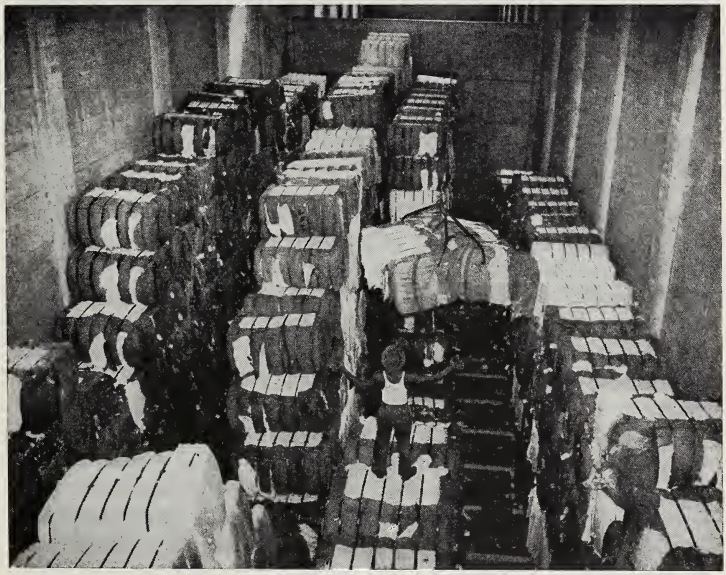
Texas is the leading cotton growing state and the cotton crop is the most valuable grown in a single political subdivision in the world.

Cotton-growing on a large scale received a tremendous impetus upon the invention of Eli Whitney's cotton gin in 1793. Up to the time of the Civil War, 1861, by far the larger part of the cotton crop was exported to England for manufacture. After the Civil War cotton factories in New England gradually increased their output as the United States grew in population and in wealth. There was very little manufacturing of cotton in the southern states. In 1890, southern mills produced but 7.5% of the total manufactured within the Union. The bulk of their crop was still being exported to the Pennsylvania-Maine section and to Great Britain. During the last forty years, however, there has been a gradual growth of manufacture within the cotton-producing region, and at the present time southern factories turn out 60% of the cotton manufactured in the United States. The principal factories

are in the states of North and South Carolina, Georgia, and Alabama.

The principal export markets for cotton listed in order of size are: Savannah, Norfolk, Charleston, and Wilmington on the Atlantic coast, and Galveston, New Orleans, and Mobile along the Gulf coast. Galveston's cotton trade exceeds that of all other cotton markets and export centres.

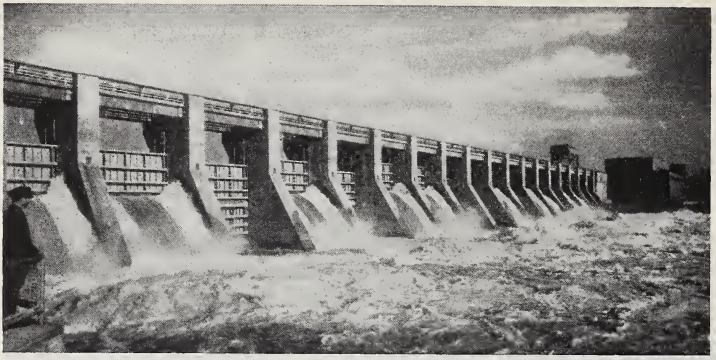
The majority of the southern cotton mills are located on either side of the Appalachians, where electric energy is secured from the numerous streams. Steam plants are also in use to supplement the hydro-electric power. The labour supply has been drawn



Courtesy Wheeler Newspaper Syndicate

Bales of cotton being removed from a New Orleans warehouse for shipment.

from the farms rather than from European immigrants as in the Philadelphia and New York districts. And this southern labour, both negro and white, is proving quite satisfactory. Labour costs are less in southern mills, the cost of living is less, and the marvel is that the south has been so long in undertaking this form of manufacture. The dry summer days are overcome by mechanical adjustments within the factory and the proper humidity of the air is maintained. It is no longer necessary to



Courtesy Wheeler Newspaper Syndicate

CHICKAMAUGA DAM
Built by the Tennessee Valley Authority on the Tennessee River near Chattanooga..

locate a cotton mill in a damp climate in order to secure the best results in spinning.

New Life in the Tennessee Valley.—As you already know, the chief crops of the southern Appalachians are cotton, corn and tobacco. All these crops extract large amounts of food from the soil. Moreover, all must be deeply cultivated to keep down weeds. Where they are grown on sloping land, the soil is easily washed away down the long furrows. Soil erosion is thus added to the evils of soil exhaustion. The result has been disaster for many farmers.

Now the Tennessee Valley has come into its own again. A succession of dams was built to prevent too rapid run-off and to develop power. The river was deepened and canals were built around the dams, so that it is navigable as far as Knoxville. The power available is used in making fertilizer to renew the exhausted soil and to run factories to give work to the unemployed. Hill slopes have been planted to grass or to trees to prevent further erosion.

The result is that the Tennessee Valley is well along the road to prosperity and offers an example of what can be done in other parts of the world.

Lumbering.—The semi-tropical lowlands of the Atlantic coastal plain from Carolina to Florida contain large areas of fine, sandy soil. Here the long-leaf pine grows in thick stands, and lumbering is an important industry. Pine forests also extend in a wide belt around the Gulf coast and into the southern portion of the Missis-

sippi River basin. Pine lumber is in demand for flooring, for interior finish, and for outside trim. A method has been devised by which paper can be made from this wood, and now the larger lumber companies run paper mills as well, and manufacture cartons and many types of paper board, in order to make use of the smaller material. In many places the pine trees are tapped for their sap, from which turpentine is distilled. This is an important by-product of the lumbering operations, and it is a common sight to see a lumber mill, a paper mill, and a turpentine distillery owned and operated by the same company. The southern Appalachians also carry a heavy stand of hardwoods, and furniture is manufactured.

Iron and steel.—There are about forty blast furnaces in operation through the mountain section of Virginia, Tennessee, Kentucky, and northern Alabama. These are located for the most part in the great Appalachian valley. Birmingham (500,000) is the largest centre, and exports steel rails. Chattanooga and Knoxville are also noted as iron and steel centres.

Atlanta (500,000) is another large industrial centre of the southland. From its location on the eastern edge of the mountains it controls the trade of the Georgia plains, as Birmingham does that of Alabama. No rail lines cross the Appalachians in the 300-mile stretch north of Atlanta, and the east-west trade converges at this point. Atlanta is the railway centre of the southern plain. Factories and warehousing are a natural result. The city has large ironworks, rolling mills, cotton-mills, and plants for the recovery of cotton-seed oil from the seeds which the gins remove from the lint. Oil cake is also made. Atlanta has large fertilizer plants, and the product is easily distributed by rail throughout the cotton belt.

The question naturally arises: Why is there no large city on the edge of the coastal plain from Norfolk to New Orleans? These coastal cities perform the function of export and import for the cotton fields and forests which stretch back to the mountains. They have little in the way of manufacture. Coal is three or four hundred miles away, and the slow tidal rivers do not provide any electric power. The manufacturing plants locate as near the source of power as the main lines of transportation will permit.

New Orleans (600,000) is the great city of the south. Its position on firm land, ninety miles from the mouth of the Mississippi, explains the choice of its location. Jetties have been built at the mouth of the river so that it will scour for itself a deep channel to the sea. In this way, and by constant dredging, ships may come up

to New Orleans and bring the thousand and one things which the people of the great Mississippi valley demand. Large quantities of coffee, bananas, and raw sugar are landed there for immediate distribution or manufacture. Shallow-draught river-boats take these and many other products up-river to Memphis, St. Louis, and beyond. From the great valley there come down-river, by barge and boat, bales of cotton and tons of cotton seed, corn and wheat, and raw sugar from the Louisiana plantations.

The waterfront of the river at New Orleans has seven miles of docks and quays, with warehouses to match. Here the ships load the baled cotton and the grain for export overseas. Factories extract cotton-seed oil, and make oil cake. The sugar mills make molasses and granulated sugar from the raw material. New Orleans is the great export-import centre of the South, having one of the safest harbours in the world. Here one may see ships from over ninety steamship lines, loading and unloading. Ten trunk railway lines, several truck and bus lines converge at this point. From the north come the barges and steamers carrying the commerce of the Mississippi River Valley. This city with a population of nearly half a million people is a world market for trade in cotton, petroleum, tobacco and sugar.

The city stands on land which is only a few feet above the river, and some sections have protective dykes. Many of the houses have no basements, as the water-table is so near the surface. The heat in summer is intense, and the location was certainly not chosen with regard to comfort. The situation of Rotterdam on the Rhine presents many points of similarity. Comparisons may also be made with Alexandria at the mouth of the Nile, and with Portland on the Columbia.

Houston (594,000) is the largest city in the State of Texas and leads all others in America in cotton exports. Great industries have been established here and it is now one of America's outstanding oil-producing and refining centres. It leads the world in the manufacture of equipment for the oil industry and is developing new industries, including synthetic rubber and chemicals.

Dallas (433,000) San Antonio (406,000) and Fort Worth (277,000) are other leading cities in the State.

THE PENINSULA OF FLORIDA

The peninsula of Florida has been raised above the sea but recently, as geologists count time. It is a little longer than Vancouver Island and about three times as wide, 400 miles by 140

miles. The peninsula has not a hill worthy of the name to break the monotonous level of its low, flat surface and gently rolling sandy plain. Bogs, swamps, and lagoons are found here and there, and the Everglades, the vast marshes which cover the southern part of the peninsula, are famous for their size and inaccessible nature. Nearly half of Florida's area is bog and swamp.

The climate of the peninsula is controlled by the warm waters of the Gulf Stream which pours into the Gulf of Mexico from the Caribbean, and moves through the Florida Strait at the rate of four miles an hour. The temperature range is not as severe as in California. The winter season is delightfully cool with bright, clear days. During the summer the temperature seldom rises above 98°F. About 75% of the rainfall occurs during the months of April to September inclusive.

Fruit.—The sandy soils of Florida are not suitable for the raising of cotton and tobacco, and in this respect the peninsula differs greatly in its agriculture from its sister states to the north and west. Both soil and climate, however, are well adapted to the growing of citrus fruits. Orchards cover the central part of the state, from Tampa to Jacksonville, 127,000 acres being devoted to this industry. Oranges are produced on a scale equal to one-half that of the California total, but Florida grows eight times as much grape-fruit as does the rival state on the Pacific coast. An occasional winter cold wave from the interior of the continent brings fear to the orange-grower, ever since the 'big freeze' of 1894-5. At that time the trees were killed, and it was necessary to replant the orchards. The higher land is now used, and by studying the slope and securing good air drainage, danger from a recurrence of a freeze is greatly lessened.

Truck gardening is another source of revenue, and the Florida farmer has developed a northern market for his early vegetables. About 300,000 acres are under this kind of crop. Celery, luttuce, string beans, peppers, tomatoes, peanuts, early potatoes, and sweet potatoes are the principal varieties grown. The Sanford celery beds in the St. John's River valley are superior to all other districts in the United States in the production of this plant. The Florida vegetable-grower has a six-week seasonal advantage over the Carolina truck farmer. But rail rates are high, and his market disappears when the lands farther north begin to ship their produce.

In the southern part of the peninsula, sugar cane is being raised in increasing amounts, while in the north, in a belt one hundred

miles wide and stretching along the Gulf Coast as far as the Mississippi, tung orchards are being developed. Tung oil, formerly imported from China, is the finest of all oils for making paints.

Phosphate.—The fine, sandy soils of Florida are poor, and need to be fertilized as soon as they are brought under cultivation. It is a fortunate thing for the farmers that the state possesses one of the largest phosphate deposits on the continent. Two-fifths of the world's phosphates are mined from the beds which stretch for over a hundred miles along the western side of the peninsula. Tampa is the distributing centre for this commercial fertilizer, most of which is distributed each year to the farmers who work the sandy soils of the peninsula and the coastal plain of Georgia and Carolina.

Development in the Southern States.—Until recently, the states bordering the Gulf of Mexico were looked on as being backward in manufacturing, and there seemed to be little hope of their competing with the North. Now this situation is changing rapidly.

Great beds of salt and sulphur have been found underground; oil wells have been brought into production in Texas, Oklahoma and Louisiana. There is also natural gas, one of the cheapest of all sources of power. Vegetables and fruit, rice, sugar cane, tobacco



Courtesy Wheeler Newspaper Syndicate

Tobacco for cigars is sprayed with fruit juice to give it a distinctive taste.



Courtesy Wheeler Newspaper Syndicate

The ocean front at Miami Beach, Florida, showing the many modern hotels.

and cotton are easily available. A new type of winter wheat is being developed which will stand more moisture. Modern science has brought air-conditioning to the factories of the South, so that workers can produce more without fatigue. Science has also made it possible to produce many useful articles from the waste products of oil and sugar refining and the lumber industry. There is limestone for cement and sand for making glass. Magnesium and bromine are also available. Coal can be brought in cheaply and an inter-coastal barge canal has been completed joining the various coastal cities. Epidemics can be better controlled with modern drugs and medicines. Living conditions are much healthier than a few years ago. Thus workers are much more dependable, and absenteeism is not nearly as great a problem as in former years.

With all these advantages, a multitude of industries can develop; ship-building, paper making, oil and sugar refining, the manufacture of textiles, binder twine, chemicals, phonograph records, synthetic rubber, oil mining equipment, and many other articles. Oil pipelines radiate in all directions, and Port Arthur, at the end of the pipelines, is said to have more oil refineries than any other place in the world.

Lumbering.—The long-leaf pine loves the sand. At one time, thirty years ago, almost the whole state was covered with a great pine forest. The lumber production reached its peak in 1916, and is now on the decline. Turpentine is distilled from the sap of the pine.

Miami (247,000) is the largest city in Florida and is the southernmost large city of the mainland. An overseas highway runs south over the cays, connecting the small islands by bridges, to Key West at the end of the peninsula. Miami's growth has been occasioned, in large part, by the tourist trade. It has steamer connections with Nassau in the Bahamas, and with Havana in Cuba.

Jacksonville (199,000) is a financial and distributing centre for northern Florida and has a large trade in lumber, turpentine, and naval stores. **Tampa** (124,000) controls the trade of the west coast, exports phosphate, and is the largest cigar manufacturer, having over two hundred factories.

The tourist trade.—Florida sells her climate to a degree unsurpassed even by California. It is estimated that the tourist trade brings over 3,000,000 visitors to Florida each year. From November to March the tourists come and go. They lie on the sands at Palm Beach and bathe in the warm water; they fish for tarpon out of Miami, and race automobiles on Daytona Beach. Luxurious hotels have been built to accommodate the trade. Some of the tourists have bought land and erected winter homes. Florida has experienced a real-estate boom of the most pronounced variety. One result has been an excellent railway system, and fine motor roads in a land which would otherwise have developed much more slowly.

The future of Florida lies in the extension of its fruit orchards and truck gardens. These will develop as the population of the United States increases and gives a larger market. The Everglades may also be brought under cultivation some day. These are vast swamps, 20,000 square miles in extent, which cover almost the whole of southern Florida. Shallow, brackish water-courses intertwine between the mounds of black muck. Large sections are unexplored. This is the home of millions of water fowl which migrate south during the northern winter. Cypress and mangrove trees fringe the waterways and the small lakes. The Everglades remain a challenge to man's ingenuity in draining them and clearing them of bush. They will probably remain as they are until the pressure of population on the land demands that the draining be done. Even then it will be an expensive undertaking.

EXERCISES

1. Boston was for many years a larger and more important city than New York. What geographical conditions gave New York its present advantage?

2. Give as many reasons as you can to account for the fact that the New England states specialize in the manufacture of textiles, boots and shoes, and small wares.

3. How have the New Jersey farmers capitalized their location near to large urban centres, and overcome the handicap of their sandy soil? Can you name any country in Europe where poor, sandy soil has been made to satisfy the needs of nearby markets?

4. Contrast the type of manufacturing done in the Central Atlantic states with that of the New England states. Account for the difference.

5. Why is it that from New York southwards the large cities are not situated at the edge of the coastal plain?

6. Why were cotton mills not earlier established in the southern states? What advantages do the southern manufacturing industries now have over those in the north-eastern states?

7. By consulting a list of Canada's imports as well as her exports show two reasons why Canada is interested in the pine forests of the Atlantic states and their development.

8. State four important reasons for the growth of Philadelphia.

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THE CENTRAL AND WESTERN UNITED STATES

The central part of the United States lies between the Appalachian Mountains and the Rockies, and includes the Mississippi River basin and the southern edge of the Great Lakes.

The plains which extend south of the Canadian border are similar in respect of contour, agriculture, and the life of the people to those which we have discussed in the section dealing with the Prairie Provinces. Millions of bushels of grain are produced. There are elevators, stores, and schools clustering around each station on the railways which gridiron this section of the land. One village or town differs little from its neighbour. One farm is like the next one beyond. The fields stretch away to the horizon, an endless sea of grain. There are few large cities, unless we include St. Paul and Minneapolis as part of this region.

Many of the farmers are now keeping cattle, poultry, and swine in order to provide for a rotation of crops, and prevent loss of soil-fertility through constant grain growing. This is especially



Courtesy Wheeler Newspaper Syndicate

A Wheat Farm in Kansas.

true of Minnesota and Wisconsin, where the land rises to rolling, glaciated uplands, in which the Mississippi takes its rise. Some of the area is swampy and dotted with small lakes. Where the swamps are drained, fine meadows are obtained, and dairying is now the chief industry of this section.

Minneapolis and **St. Paul,** (1,000,000) the twin cities, occupy a position on the Mississippi comparable to that of Winnipeg on the Red River. They are great railway centres, and serve the wheat lands to the west, and a mixed farming area to north and east. The cities have grown up at either side of the Falls of St. Anthony, where the river drops a matter of twenty feet, and is navigable with no further obstruction down to the Gulf of Mexico. This source of power was used by the early settlers to grind the grain of the nearby farms. Today Minneapolis is the greatest flour-milling centre in the United States. It is also a distributing point for farm supplies of every description. Railway repair shops and freight yards give employment to many of the inhabitants. St. Paul is a residential and commercial centre.

The corn belt lies south and southeast of the spring-wheat region and north of the cotton. Corn demands rich soil, a hot summer, warm nights, and freedom from frost. Summer showers are also necessary. Nowhere else in the world are these favourable factors found on so large a scale as in the Ohio and central Mississippi valleys.

Corn, winter wheat, oats, hay, and roots make good cattle feed. There is some export of grain from this region, but by far the larger part of the farm produce is fed to cattle, swine, and poultry. Many cattle are raised locally, but thousands of head are brought in by rail from the grazing lands at the base of the Rocky Mountains, lands which stretch from Wyoming to Texas. The corn belt is, then, a land which fattens cattle and swine for market. It deals in 'prime beef' and pork. There is a fairly large production of milk and butter, but this cannot be considered of primary importance. Dressed poultry and eggs are also produced on a large scale. When the animals and the fowl are ready for market they are shipped to the nearest receiving station to be finally processed. This has led to the growth of packing centres such as Chicago, St. Louis, Kansas City, and Des Moines.

A map will show that many lines of railway run east from the range lands to the corn belt. These bring in the range cattle to the feeding centres. The packing towns are at the place where several lines of railway converge. Some of the rail lines extend

over the mountains to west and east. In this way there has developed an interchange of products and of goods on an east-west basis, which is rather unusual, where the natural drainage lines run south to the Gulf of Mexico. The last century has seen the development of this great rail network to the point where the water-routes are being neglected.

In recent years, however, navigation on the Mississippi, the Ohio, and other tributary streams has been improved, and traffic is increasing. More and more the gulf is thought of as a cheap route for the export of bulky commodities, and as an import centre for many of the things which the people of the central plain require. New Orleans and St. Louis are already feeling the effect of this change.

INDUSTRIES

Oil-fields of the central plain.—Petroleum and natural gas are abundant in Texas and Oklahoma. Louisiana, Kansas, Arkansas, and Wyoming also have large producing wells. It has been estimated that the southern United States, west of the Mississippi, contain more than 5,000,000,000 barrels of oil, the largest known deposit. Petroleum was discovered in western Pennsylvania in 1859. New fields were opened in Ohio, West Virginia, and Kentucky. Natural gas-fields were found in Illinois and Indiana. So rapid has been the production from these fields, that it is thought



U.S. Oil Fields and Pipelines.

that one-half the known oil reserves of the United States have already been used. At the present rate of production, over 2,000,000,000 barrels annually, the next thirty years may see the exhaustion of this wonderful fuel.

Pipelines have been built across the continent from the Texas field, through Illinois and Ohio to Pennsylvania and New York, where the great refineries are located. The distribution of this liquid fuel is one of the marvels of the twentieth century, and has aided greatly in the industrial expansion of this section of the United States.

Iron and steel.—The district to the west and south of Lake Superior contains the largest iron mines on the continent. More iron ore is mined in the two states of Minnesota and Michigan than in any other district in the world.

In the Mesabi Range west of Duluth the ore lies so near the surface and is so soft and loose that it can be mined with electric shovels from huge open pits. The railway cars run down to the docks, where they unload by means of trip bottoms into bins. The long ore vessels are loaded from the bins, the ore sliding down chutes into the open hatches. The steamers carry the ore down the lakes to the foot of Lakes Michigan and Erie, where they are unloaded by means of clam-shell buckets, five tons at a bite. The number of hatches permits the unloading to be done very rapidly. Unfortunately, the resources of iron in these mines were so seriously depleted during the years of the second World War, that iron deposits are being sought all over North America. The enormous deposits in Labrador and northern Quebec will, when mining begins, help to fill this need.

The short rail haul from the mine to the dock, the long lake haul, with only one canal lock to go through, makes delivery at Lake Erie or Lake Michigan cost but a few cents a ton. At Chicago, Toledo, Ashtabula, Cleveland, Erie and Conneaut the ore meets the coal from Ohio and Pennsylvania, and is there manufactured by the blast furnaces and rolling mills of this region. Although these centres of manufacture are far inland, the advantage of the cheap iron ore makes it possible for them to compete with any other place in the world in the production of pig iron and structural steel.

A large amount of grain and lumber is also brought down from Lake Superior ports. Some ore vessels get a cargo of coal to take back, but the ore tonnage down the lakes is far greater than the amount of freight going up. Coal can be delivered so cheaply that

Sault Ste. Marie and Hamilton, on the Canadian side, have large steel works.

Chicago (4,600,000) is next to New York in size, yet it is a thousand miles from the sea. Many natural factors combine to make an inland city of this size possible. In the first place Chicago is a lake port, and controls the trade of Lake Michigan as Toronto controls the trade of Lake Ontario, and Buffalo the trade of Lake Erie. There is iron to the north, coal to the south-east, and this makes Chicago a natural manufacturing centre for the prosperous farming population to the south and west. Great warehouses, stores, and mail-order houses carry stocks of every kind of merchandise. Then, too, Lake Michigan protrudes a long way down into the



Courtesy Wheeler Newspaper Syndicate

A view of Chicago's downtown skyline, from the Outer Drive.

central plain. Traffic routes east and west crowd together in order to get around the southern end of the lake. They pass through, or send branch lines into the great city. Chicago controls the trade of an inland empire, much as Winnipeg does in Canada.

Gary has been built on the sand dunes thirty miles east of Chicago in order to get room in which to conduct the iron smelting necessary for the factories of the Chicago district. The ore vessels unload beside the furnaces; the molten iron is turned into steel, and while still hot is rolled out into plates, girders, and rails. Some is made into bars, rods, and nails. The factories which make agricultural implements of every kind get their iron and steel from

this great plant, and sell their products throughout the farm lands. South Bend, farther east, is noted for its manufacture of stoves and furnaces, wagons, carriages, and automobiles.

The farm lands to the south and west of Chicago send in their fat cattle, hogs, and poultry, and the stockyards on the edge of the city cover many hundred acres. The meat-packing plants process the animals for market, and this employs thousands of people. Every part of the animal is used. The carcass is frozen or chilled, and may find its way as far east as Boston or New York. Corned beef is made from the shreds and pieces; the hides are tanned, the hoofs and horns are made into glue, and the refuse is turned into fertilizer.

Chicago is also a grain centre, and exports millions of bushels of corn and wheat down the lakes and the St. Lawrence during the open season. The export of United States grain through Montreal during the early summer makes up, to some extent, for the winter export of Canadian grain through Buffalo and New York.

The great city is built on an almost flat plain, through which a small stream once flowed into Lake Michigan. Going up this sluggish waterway, one came to a low divide, and then to the Des Plaines River flowing into the Illinois and so to the Mississippi. This was a well-known trade route in the early days. As Chicago grew in population the problem of a pure water supply became acute. If the sewage were dumped into Lake Michigan it would contaminate the water, making it unfit for drinking purposes. So engineers dug a great ditch from the Chicago River to the Des Plaines River, reversed the flow of the former stream, and diverted water from Lake Michigan southwards to the Gulf of Mexico. This drainage canal carries off the sewage of the great city, and the water of Lake Michigan is kept pure. The business men of Chicago saw opportunities for traffic through the drainage canal, and now it is better known as the Barge Canal. Long barges, loaded with such things as heavy machinery, carry their freight slowly southwards to the Mississippi system of waterways. Return cargoes of grain, cotton, hides, and oil cake come slowly up the riverways to Chicago. As a result, Chicago is not only a great lake port, but trades with the central United States and with the Gulf of Mexico via the Mississippi and its tributaries.

Other centres of industry.—Lake Erie enjoys advantages for manufacturing almost equal with those of the southern end of Lake Michigan. Cleveland has large steel works and machine shops, and is a forwarding port for iron ore going by rail to

Pittsburgh, and for coal going up the lakes by steamer. Toledo is of similar appearance. Large automobile factories are located in both cities. Automobiles need tires, and Akron, thirty miles south of Cleveland, is a centre of the tire industry. Youngstown, a few miles to the east, is almost a second Pittsburgh and manufactures iron and steel, and has shops which make machinery.

Detroit (2,700,000) is the great automobile centre of the United States. It is situated where the iron ore, southbound, and the coal, northbound, meet and pass. It is on the direct rail route from the Mohawk valley, across Niagara, and by Windsor-Detroit to Chicago. More automobiles, trucks, and tractors are manufactured in Detroit, South Bend, Toledo, and Cleveland than in any other part of the world. Flint and Lansing are also engaged in automobile manufacture. If we add the production of Windsor in Canada to that of these cities, it might be said that the automobile industry is largely a Lake Erie enterprise. And as long as the Minnesota iron ore comes down to meet the Ohio coal it will continue to be so.

Michigan is still heavily forested, and factories have been established which make furniture for the people of the Mississippi valley. The city of Grand Rapids is known today as the furniture town of America.

Milwaukee manufactures mining and logging machinery, engines for boats and farming machinery. It is a smaller Chicago, and enjoys the advantages of a lake port with railways radiating westwards to the plains. There are also meat-packing plants, boot and shoe factories, and knitting mills.

Dayton, in Ohio, is the city where cash-registers are made. As these are small, expensive, and highly specialized machines, the transport by rail, rather than by water, is not a deciding factor in the location of the industry. Springfield, Indianapolis, and Cincinnati all manufacture machinery of various kinds. They have factories making agricultural implements, wire-fencing, and stoves, and mills making cereals. Cedar Rapids, Iowa, is the United States home of Quaker Oats.

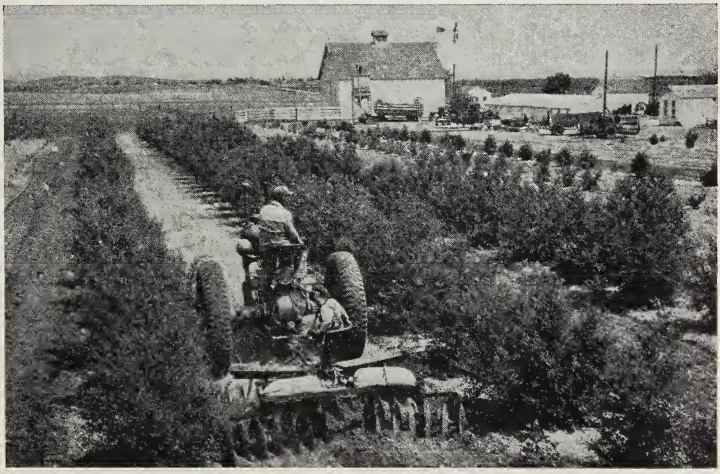
St. Louis (1,600,000) occupies a commanding position just below the junction of the Missouri with the Mississippi. It was first an outfitting point in the fur trade of the west, and, like Winnipeg, had grown into a large town before rail lines were laid through the plains. It was a great river transport centre in the days of Huckleberry Finn and Tom Sawyer. When the railways were built across

the plains they could not afford to pass St. Louis, and the city has become a distributing centre for the southern part of the corn belt and southwards into the cotton belt. Its stockyards cover a square mile in area, and it boasts the largest horse and mule market in the country. The manufactures include boots and shoes, tobacco, and agricultural implements.

Kansas City is a market for grain and livestock, and a railway centre of the first importance, with thirty-nine lines and a fifty-million dollar terminus for handling freight cars. The meat-packing plants do a tremendous business. Together with St. Joseph, Omaha, Sioux City, and Des Moines we have a group of cities which lie within the western edge of the corn belt, and receive fattened animals and process them for market. Chilled beef, canned beef, bacon, ham, and lard are the principal products of all these cities.

THE WESTERN UNITED STATES

The great plains.—These border the Rockies in a wide sweep from Alberta to Mexico, with an average width of 200 miles, and an elevation of from 2,000 to 5,000 feet. Nearly all this area lies within the rain-shadow of the Rockies, and is too dry for farming. It is a vast range land where cattle feed on the succulent bunch grass, and are shipped in their thousands to corn-belt farms to be



Courtesy U. S. Soil Conservation Service

A Nebraska farmer cultivates his shelterbelt.

fattened for market. The atlas will show the comparative lack of cities or concentration of industry of any kind. Railways cross the plains region from east to west seeking a gap in the mountain wall; few lines run north or south through this area. What cities there are have grown up at the gaps in the Rockies. Helena, Cheyenne, Denver, Santa Fé, and El Paso are cities of this type. Of these Denver is the most important. It is a distributing centre for a large area and happens to be just one mile above sea-level. Mining is an important industry in the Colorado Rockies, and Denver, with its good rail connections, has been the supply centre and the financial centre for the mines. There are grazing lands in the mountain valleys, and meat packing is carried on. Denver is also a tourist centre, and thousands of people from the eastern United States outfit from there each year. Several hundred thousand acres of land have been put under irrigation, and the manufacture of sugar from sugar-beet is a profitable industry.

The Cordillera.—The mountain ranges of British Columbia extend southwards through the United States and Mexico. Many of the features which have been noted in the Canadian portion are found repeated in the states which have been carved out of this great region. The Rocky Mountains continue to form a barrier between the plains and the Pacific. Near the sea, there are the Coast Ranges, while in between there is an elevated plateau. The highland is at its widest between San Francisco and Cheyenne, a distance of over 900 miles. The plateau is obviously much wider here than in Canada, and as we go southward to Mexico it is much drier as well.

The Puget Sound trough.—The larger part of the population of Washington and Oregon is found in the lowland area which lies between the coastal ranges and the Cascade Range. These valley lands extend from Puget Sound to the Gulf of California, a distance of 1,200 miles. The inside passage from Puget Sound northwards to Alaska is a drowned portion of this great north-south valley. If the land south of Seattle were depressed a few hundred feet, we would be able to sail from the Gulf of Georgia to the Columbia River and out by a Columbia strait into the Pacific. The Olympic Mountains would form an island, as does Vancouver Island. The Klamath plateau, however, would stop our entry into the valley of California, or, as it may be called, the California trough. Comparisons may be made with the great Rocky Mountain trench, although three striking differences occur: the Puget-California trough is near the sea, it is low in altitude, and it

is much wider than the trench, so that the word trough gives a clearer idea of its appearance.

The climate of this district is oceanic on account of the low altitude and the nearness to the sea. The states of Washington and Oregon have a forest stand similar to that in British Columbia. Lumbering is the great and widespread industry of the people. The size of the trees makes the use of the donkey engine, the steel cable, and the railway as general as in British Columbia. Lumber mills are built on similar models, use the same kind of machinery, and cut thousands of board feet each working day. In these two states lumbering is on a tremendous scale, and they produce the larger part of the total lumber cut of the United States.

Dairying, mixed farming, and fruit growing are the principal forms of agriculture on the cleared lowlands.

Seattle (600,000) is the chief shipping centre at the northern end of the trough. It compares with Vancouver in rapidity of growth since 1900. The gold rush to the Klondike in 1898 gave Seattle its start. Thousands of miners outfitted at Seattle for Skagway and the trail over the Chilkoot Pass to Dawson. Today four railways converge at Seattle. The city is an export-import centre for the trade of the Pacific north-west; it has a large trade with both Alaska and the Orient. It has ship-building yards, paper mills, canning factories, and an aeroplane-manufacturing industry. Tacoma is a smaller town with a large smelter. It receives ore and concentrates by water and by rail, and exports the finished metals by either route.

The Willamette Valley.—The Columbia River cuts through the Cascades and traverses a part of the trough until it finds a way through the Coast Range into the Pacific. The Willamette River joins the Columbia from the south, and its broad valley completes the Puget Sound trough. This is the heart of Oregon. Since this section has a lighter rainfall, the open park-lands of the Willamette were the first to be cleared for settlement. It is today one of the most productive areas in the Pacific north-west. Grain, hay, wide pastures, livestock, and dairying are seen on every hand. Prunes and cherries do well. Prunes are dried in evaporators, in which the temperature, humidity, and circulation of the air are controlled, thus producing a uniform article. Cherries are usually canned. Large quantities of small fruits, such as loganberries, raspberries, and blackberries, are also grown. The factories turn them into jam, preserves, and fruit juices.

Portland (535,000) is the metropolis of Oregon. Within recent years a sum of $32,000,000 has been spent in deepening the



Courtesy Wheeler Newspaper Syndicate

Timber, on the way to saw-mills, is moved down the Columbia River in Oregon.

channel of the lower Columbia and in building jetties at the mouth of the river. The result is a clean forty-foot channel through the sandbars below Astoria. Portland exports wheat from the Columbia plateau, lumber from the forested mountain ranges, as well as the products of the fruitful valleys. It is a centre for the salmon-fishing industry, for which the Columbia is noted, and an important ship-building centre.

The Columbia plateau.—East of the Cascade Range is a wide plateau similar to that of central British Columbia. Over much of this region, however, the surface rocks are of lava. In ancient times the lava was poured forth from long cracks in the earth's crust until it covered thousands of square miles to a depth of hundreds of feet. Since that time the soft lava rocks have been weathered into a soil of wonderful fertility. The Columbia and Snake Rivers cut across the lava field in deep canyons.

The rainfall of the plateau is under twenty inches, but is sufficient for the growing of grain. During the dry summer the wheat cures on the stem and combines are used to cut and thresh the ears of wheat in one operation. The undulating nature of the plateau is eminently suited to the use of machinery.

The Walla Walla, Yakima, and Wenatchee Rivers flow into the Columbia through broad, mature valleys. Fruit is grown on the irrigated bench-lands as in the Okanagan valley of British Columbia, but on a much larger scale. Almost 500,000 acres in eastern Washington are under irrigation. In addition to fruit there is a large production of alfalfa, hay, oats, and potatoes. Stock-raising and dairying are also important industries.

Spokane (160,000) is the large city of the Columbia plateau. It is situated on the Spokane River at the lower end of a broad valley where the river falls over a ledge of hard rock in a series of cascades. These provide power for the city and the surrounding district. Spokane is a manufacturing centre. Flour mills grind the grain from the wheat fields, and meat-packing plants handle the product of the range lands. The city is also a supply centre for the mining districts of Pend d'Oreille and Coeur d'Alene. Railways branch out to every part of the plateau which lies within the bend of the Columbia River.

The Great Valley of California.—The Klamath plateau interrupts and closes the southern end of the Puget trough. After one hundred miles of rugged hills the Great Valley opens before us. Two rivers drain this area, the Sacramento and the San Joaquin, each flowing into San Francisco Bay. The 400-mile stretch from Redding to Bakersfield is the heart of California. To the west lie the broken ridges of the Coast Range; to the east, the high rampart walls of the Sierra Nevada shut off the valley from the great basin of Nevada.

The Sacramento Valley has a climate which resembles, during the winter season, the coast district of British Columbia. There are rains and mild weather with an almost complete absence of frost. This is due to the lower latitude and to the Klamath and Sierra-Nevada mountains which bar the cold winds from the north and from the interior of the continent. In summer the weather is hot, and dry, owing to the line of coastal hills which keeps out the cool sea breezes. The rainfall varies from twenty-five inches at the northern end to five inches at the southern end of the valley. This was enough for grain growing and cattle ranching, which were the main agricultural activities following the gold-rush days. As the population increased markets were found for both vegetables and fruit, and now the Sacramento Valley is producing many varieties of foods. Dams and reservoirs store the winter precipitation, and irrigation systems spread the precious water over the thirsty land during the hot summer. Forty-six per cent of all cropland is irrigated, and four million acres now under cultivation use water supplied by the irrigation projects.

Fruit orchards stretch throughout the valley. It is one of the great fruit regions of North America. Apples, cherries, peaches, and almonds are grown in the upper Sacramento, and some oranges in Butte and Glenn counties. Farther south are orchards of pears, peaches, prunes, plums, almonds, and olives, with large

areas in grapes. On the uplands, hay, wheat, barley, potatoes, and livestock are produced. Along the river bottom land, vegetables and garden truck are grown, and large quantities of rice are produced from the low-lying fields. Truly a wonderful assortment of products from one valley.

The valley of the San Joaquin is equally rich, and since it is farther south the climate is even warmer, the summer season is longer, and there is less danger from frost. As a result the orange groves increase in size and number. In the vicinity of Fresno we come to the vineyard district, the home of Sun Maid raisins. Each grower dries his grapes in shallow trays between the rows of grape vines. The raisins are then taken to Fresno, where there is a huge concrete factory, employing as many as 1,600 people, who put the raisins into packages for distribution throughout the continent. Large areas of the San Joaquin are still devoted to grazing and cattle-ranching. Cotton is now an important crop. Irrigation is necessary in order to grow fruit of any kind. The main streams come down from the Sierras, and the area which they can water is limited. Artesian wells have been bored and by their aid many more acres have been brought under intensive cultivation. The number of wells has reached the point where the water-table in the soil is being lowered, and many of the wells have ceased to flow. It is estimated that 10,000 pumps are in use to raise the necessary water. It would seem that the limit of irrigation has been reached under present methods, as far as the San Joaquin valley is concerned.

Bakersfield, near the southern end of the valley, is a great oil centre. A forest of derricks rises over the wells, and millions of barrels of petroleum are produced each year. This provides cheap power for a valley deficient in coal. In addition, the Sierras provide water-power sites, and the whole of the San Joaquin is served by electric light and power lines.

The Sierra Nevada Range has been called the 'Mother of the Great Valley'. This rampart of mountains, from 2,000 to 14,000 feet in height, borders the eastern side of the Sacramento and San Joaquin river valleys. It is much higher than the coastal ridge which extends southwards from the Klamath plateau. Because of their height the Sierras intercept the moisture-laden winds from the ocean, and during the winter season the snowfall in these mountains is remarkably heavy. At the station of Summit, Southern Pacific Railway, elevation 7,017, the average snowfall amounts to

thirty-five feet per annum. Sometimes the snow lies twenty-five feet in depth as late as the first week in March. As the heat increases the snow melts slowly, and gives a much longer time for the run-off. The rivers are in flood during the early part of the hot, dry season. Dams have been built to hold back millions of gallons of water for irrigation It has been well said that the prosperity of the valley lies in the lap of the Sierras.

The Sequoia (*S. gigantea*), the 'emperor of trees', has its home in this great range. The wood is hard, red in colour, and free from pitch. It is used in the construction of houses, furniture, boats and incubators. The trees grow in sheltered valleys protected from strong winds, and there one may see trees twenty to thirty feet in diameter. Some of the monarchs of the forest are known to be nearly four thousand years old.

San Francisco.—(2,000,000) A part of the Great Valley has been flooded by the sea. The waters came in through a gap in the Coast Range, the celebrated Golden Gate. San Francisco Bay is a large, navigable basin able to handle all the commerce which the Pacific may offer. San Francisco city is located at the south side of the Gate, and is the commercial centre of this region.

The heat of the Great Valley is not felt in San Francisco. The climate of the immediate coast is cooled by the cold waters of the ocean. It has been found that the Pacific is warmer a hundred miles off shore than it is close to the coast. The moist inflowing air is chilled as it passes over the cold water close to the shore, and heavy fogs are formed. These drift in through the Golden Gate, and spread over the bay and the low hills around the city. This is especially true of the nights and early morning hours. As the sun rises and gathers strength, the heat dries up the fog blanket, and the days are bright and warm. San Francisco has a July average 59°F., and is a summer resort for the people who live in the hot interior valleys of California.

In 1906 a disastrous earthquake wrecked the city. The water mains burst, and a great fire swept unchecked through the business section. Since then a new San Francisco has been built on modern lines, and with due regard to a possible repetition of the events of 1906.

San Francisco is an import-export centre for central California, and for a large part of the western United States. It carries on a large trade with the Hawaiian Islands, the Philippines, Australia, and South America. Manufacturing includes shipbuilding, oil refining, lumber mills, publishing houses, and the making of

marine engines. It has large iron and steel works, and an important seaplane base.

Oakland, Berkeley, and Alameda lie across the bay from San Francisco. The first is a manufacturing and trading centre; a bridge connects it with 'Frisco'. At Berkeley, the state has built a great university and one may see many fine residences. Altogether over a million people live in these four centres on either side of the harbour.

Southern California.—The Sierras curve round to meet the coast ranges south of Bakersfield, but nature has provided the Tehachafu Pass which the railroads use on their way to, and through, the Mojave desert and westwards to the coast. The San Bernardino Mountains cut off the desert from the sea, and southern California may be regarded as the strip of land from Santa Barbara to San



Courtesy Wheeler Newspaper Syndicate

CANNING FACTORY, LOS ANGELES.

When the oranges arrive, they are inspected and washed. They are then carried on belt conveyors to squeezing machines which extract a thousand gallons of juice an hour.

Diego, comprising the short river valleys of the Santa Clara, Los Angeles, and Santa Ana Rivers. In this small section we have again a most intensive system of irrigation. This is the great orange belt of California, with centres at Santa Ana, Riverside, Pasadena, and San Bernardino.

Irrigation of the orchards is necessary five to eight times during the season, April to September. The supply of water is barely equal to the demand. There are few places where water is so carefully handled. Lemons, grape-fruit, and olives are grown in large quantities. Canneries pack the crops of peaches and pears, and apricots are dried for market. Vineyards are found on the coarser soils, and require little irrigation. Table grapes, grape-juice, and raisins are also produced.

Los Angeles (3,917,000) is the great metropolis of the south. It is the centre of a tourist business which advertises far and wide the beauty of the landscape, the pleasant qualities of the climate, and the excellent and variety of the sub-tropic products. People come to visit and remain as permanent residents. Thousands of the well-to-do from the central and eastern sections of the continent have bought homes and retired in southern California, and it is said that more people live there without working than in any other part of the United States. The result has been an overgrowth of population, with many looking for work to supplement a small income. Manufacturing establishments have taken advantage of this condition and now the district around Los Angeles is becoming solidly industrial. There is fuel oil at Long Beach and at Bakersfield, which makes up for the lack of coal. Within recent years Los Angeles has become the most important centre in the country for the manufacture of aeroplanes. It also has an important automobile industry and manufactures tires.

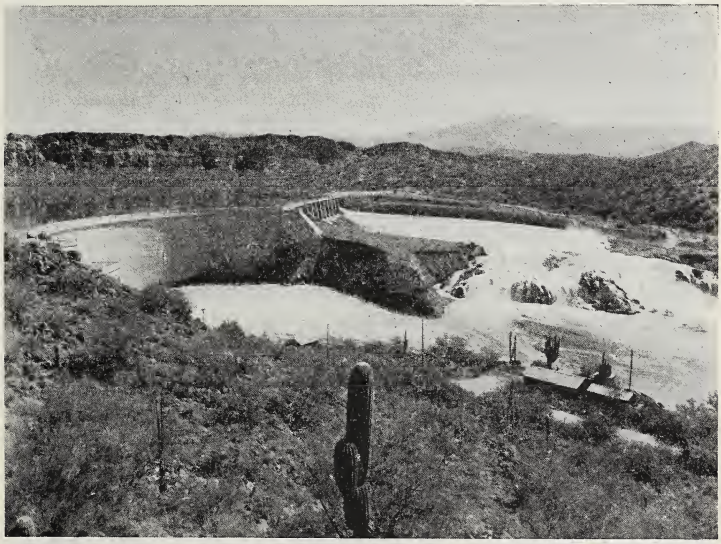
The moving-picture industry of Hollywood, a suburb, distributes annually films worth $150,000,000. This industry has brought in its train certain supply industries, such as the production of chemicals, and furniture and clothing factories. Access to the sea became a necessity, and the port of San Pedro was dredged, breakwaters were constructed, and now Los Angeles has steamship connection with all parts of the world. A water supply for the city was secured at immense cost, by a 225-mile aqueduct, which brings water from the east side of the Sierras through a canal and by means of a tunnel under the mountain into the Los Angeles basin. San Diego, further south, is an important naval base. It also has great aeroplane manufacturies and canning plants.

Fisheries.—The California coast from San Francisco Bay southwards to Mexico presents a somewhat regular appearance, yet fishing is important. There are many sardine canneries and the annual production is worth nearly $10,000,000. The sardines are in reality small pilchards, which either come up the coast or come in from the sea during the fall of the year. The season lasts from October to the following March. Monterey, San Pedro, and San Diego are the principal centres. The fish are put up in one-pound oval tins and are sold to countries in every continent. The mature pilchard which is caught off the coast of Vancouver Island is a much larger fish. Large power-boats fish out of San José and San Diego for tuna, albacore, bluefin, yellowtail, and swordfish. The boats cruise southwards as far as Cape San Lucas, and carry live bait—minnows and small pilchards—in large wooden tanks. The total value of the California fisheries has amounted to $27,000,000 in a single year. California now holds first place in the United States in the amount and value of fisheries. The catch of pilchard, tuna, barracuda, and abalone is the largest in the country.

The Imperial Valley lies a short distance south-east of Los Angeles, between the San Bernardino Range and the mountain ridge of the California peninsula. The Gulf of California once reached 150 miles farther inland, and the Colorado River then flowed in from the eastern side at a point where Yuma is today. But the Colorado gradually filled the upper end of the gulf with fine silt, and now winds its way through many miles of low swamp land to its outlet. A portion of the Imperial Valley is 200 feet below sea-level, but a small lake, the Salton Sink, is all that remains of the ancient lake bed.

When settlers first came through this valley they found it a desert, an area of great heat and almost no rain. So it would remain if canals were not dug to bring in the life-giving water from the Colorado. This was the situation in 1900. Twenty years later, 60,000 acres in the United States and 150,000 acres in Mexico had been put under irrigation. Dates are now grown from seedlings imported from Egypt. Garden truck, lettuce, and cantaloupes are grown for the early spring markets of the central and eastern United States. Grapes grown in the Imperial Valley ripen in July and are shipped out by the carload. Egyptian cotton is also grown, and commands a high price. Corn, sorghum, and alfalfa are produced in large quantities. The alfalfa crop averages six cuttings a year and yields as much as five tons an acre. Much of it is baled

and sent to the Los Angeles district to feed dairy cattle. The part of the valley north of the Salton Sink is called the Coachella Valley. The chief crop of this district is dates. Only a part of the whole valley is under cultivation at present. It will be interesting to watch the development of this huge area, where a million more acres can be irrigated if the flood waters of the Colorado are stored by dams and reservoirs. The Boulder Dam should do much in this direction.



Courtesy Keystone View Co.

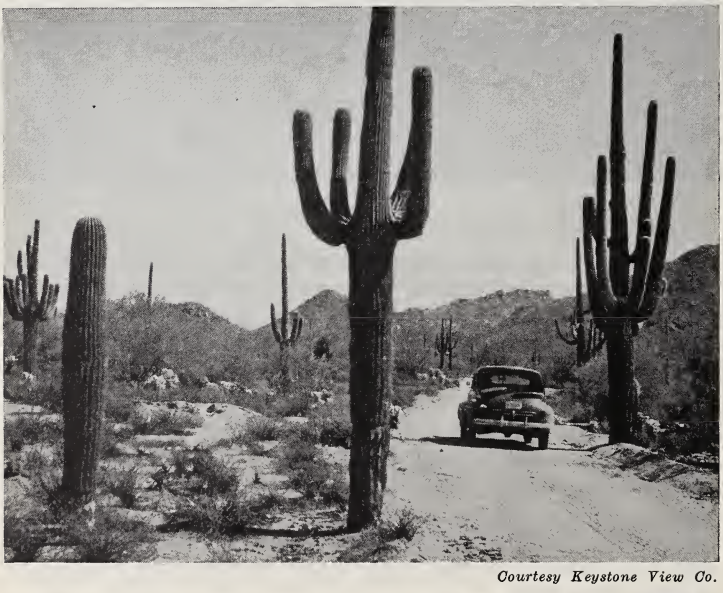
STEWART MOUNTAIN STORAGE DAM ON THE SALT RIVER, ARIZONA.

A similar irrigation project in the Salt River-Gila Valley has brought another large valley area under cultivation. Rich soil, great heat, and continuous sunshine have made these lands the most productive in America. The famous Roosevelt Dam 235 feet in height, impounds the water for many miles up stream. It is this water, led through concrete irrigation canals and ditches, which has turned a burning waste into a productive area. Alfalfa is extensively grown, and there has been a large export of butter from the dairy herds. Oranges ripen earlier here than in the Los Angeles district, and the section near Phoenix is exporting early citrus fruits. Egyptian cotton is grown on a large scale. The long fibre is in demand for the manufacture of cord tires because of its greater strength.

The great disadvantage of these lands is their isolation and distance from the main centres of population. Transportation charges eat up the profits on the garden truck which could be raised, and there is competition with the well-established fruit industry of the San Joaquin and Santa Ana Valleys of California.

The American desert.—The vast stretch of country which lies between the high Sierras and the Rockies is even more deficient in rainfall than the part facing the Pacific. The interior plateau of British Columbia has a light rainfall and vegetation is rather scanty, but the lower latitudes of the inter-mountain region in the United States are subject to more direct sunshine and the greater heat dries out the surface soils more rapidly. The greater width of the plateau merely intensifies the condition, and deserts as dry and barren as the Sahara are found from the Rio Grande northward to the vicinity of Great Salt Lake and the valley of the Snake River. But irrigation in the Snake River Valley is making possible the production of alfalfa, sugar-beets, potatoes and vegetable seeds.

Here one may see flat-topped mesas, inaccessible buttes, deep, narrow canyons, and piles of gravel wash. Volcanic cones rise



Courtesy Keystone View Co.

Scenic road through the Arizona desert, showing the giant *Sahuaro* cactus.

above the plateau level, while here and there large lava beds are found.

The lower elevations up to 3,000 feet are generally devoid of vegetation; on the higher mesas, 5,000 to 6,000 feet, there is sagebrush and coarse grass; and above this region cedars and scattered yellow pine extend up to the snow-line at 7,000 to 8,000 feet. Sheep, goats, and cattle can graze on these slopes, and, where water can be secured, either from piping down from some high spring source or by an artesian well in a suitable draw or gulch, there are ranches.

An area of interior drainage is found in the Great Basin, which covers much of the state of Nevada. Rivers and streams flow down from the snow-capped Sierras and from the Wasatch Range to the east, only to lose themselves in the dry wash at the foot of the mountains.

In the case of Great Salt Lake in Utah, the lessening rainfall has caused a once great lake to shrink to its present shallow level of eighteen feet. As early as 1848 the Mormon immigrants began diverting the streams from the mountains to the fertile, gently sloping soils of the old lake bed. Today all that can be served by the available water supply is under cultivation. There are thousands of acres of fertile land remaining, but there is no more water. Hence this region is unlikely to develop further agriculturally. **Salt Lake City** (245,000) is the largest centre of population in the dry lands of this section of the interior plateau. It is a religious centre, and maintains fine schools and colleges. There is a considerable trade in salt, which is evaporated in shallow ponds beside the lake. The surrounding agricultural lands send their surplus to Salt Lake City for sale east or west, and the city is a distributing centre of a large area.

Idaho and the Snake River.—North of the Great Basin a large area is covered with a succession of lava flows and deposits of volcanic ash and mud. These stretch from the Cascade Mountains of Oregon to the Rockies in Montana. Part of this area is known as the Great Sandy Desert. The Snake River runs in a wide curve through southern Idaho, and has cut its way down through the lava until there are canyons 4,000 to 6,000 feet deep, rivalling those of the Colorado.

Ranching.—Lava soils are generally fertile, and the Snake River Valley and the southern Idaho support herds of cattle and sheep. Beef and wool are valuable products, but this industry leads to a thinly scattered population and small towns. The majority of the



Courtesy Wheeler Newspaper Syndicate

Cattle are summer-grazed in the Beaverhead National Forest, Montana.

people in Idaho live in the northern part of the state and are employed in mining.

Mining.—Here and there throughout these arid lands minerals have been found, and some large mining camps have grown up beside the deposits of ore. There is a large copper mine at Bingham, sixteen miles south-west of Salt Lake City. Silver and lead are also mined in large quantities. Gold-silver-copper deposits are mined at Tonopah in south-western Nevada, at Goldfield, twenty-four miles to the south, and at Bull Frog and Ely, sixty miles south-east of Goldfield. Copper is mined at Jerome, in central Arizona, and at Bisbee, in the south-west corner. Arizona leads in the production of copper with a yearly output of 524,000,000 lbs. The great copper mine at Butte, in Montana, is one of the wonders of the mining world. A whole mountain of copper-bearing ore was found in 1869 and has been mined ever since, producing over a billion dollars' worth of copper. Mines and smelters are the mainstay of Butte, Great Falls, Helena, and Anaconda.

The Coeur d'Alene district in northern Idaho produces silver, lead and zinc. The Joplin District in the Ozarks is also important for its production of lead and zinc.

The Grand Canyon of the Colorado is one of the deepest and most awe-inspiring gashes to be found anywhere in the world. The river winds its way a mile below the level of the plateau. A railway line runs to Flagstone and a trail has been cut down

the steep canyon wall. It is only at high noon that the sunlight penetrates to the bottom of the canyon. The canyon has been set aside as a national park and thousands of tourists visit it each year.

Summary.—The farm lands of the great plains have problems similar to the corresponding region in Canada and they are being dealt with in much the same way. The Government has passed laws to make it possible for farmers to organize Soil Conservation Districts. These obtain advice and help for farmer members from the Soil Conservation Service of the U.S. Department of Agriculture. This is one of the most highly developed scientific services for conservation anywhere in the world. Canadians who are working in conservation learn a great deal from the work of the American service.

On the soils in the eastern, warm, and humid regions of the United States are found the most spectacular abuses of land and also the most spectacular efforts to remedy them. In regions of high rainfall erosion is very serious. It was in these very regions, especially in the south, that European settlers established the 'plantation' type of farm. These are large holdings, worked formerly by slaves and later by share-croppers and tenants, devoted to a single crop, tobacco, corn, cotton or sugar. There was no crop rotation and the results eventually were disastrous.

A wonderful example of how the governments, and the people of an area can bring about wise use of their resources is the Tennessee Valley Authority. In this development, river control, soil conservation, forestry and industry which uses local power and resources, are all worked out to a plan which is remedying the terrible ills that resulted from the old system.

EXERCISES

1. Why are many farmers of the central plains who formerly raised only wheat turning more and more to mixed farming? Give as many reasons as you can.

2. What conditions have contributed to the growth of Minneapolis and St. Paul? What does Minneapolis manufacture? Account for these industries.

3. The United States produces about two-thirds of the world's output of corn, and yet exports less than Argentina. Give as many reasons as you can to account for this.

4. Why has Chicago a greater mail-order business than New York?

5. Draw a sketch-map of Lake Erie and the neighbouring territory. On it print the names of the chief cities connected with the automobile industry. Show the most important transportation routes. Along arrows indicating the direction from which they come, print in the names of the raw products used, and their point of origin.

6. What are the factors that have made California the most important fruit-growing region in the world?

7. California is said to have a Mediterranean climate. Consult a graph showing the climatic data for Sacramento and compare it with those for Naples, and for Santiago, Chile. Compare the latitude of these places. In each case, at what season does the greatest precipitation occur? What effect has this on agriculture? How would you explain the blue skies of these regions?

8. Consult a physical map of North America. Why were the problems of railway building in western United States more serious than those met with in western Canada?

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16

ALASKA AND THE HAWAIIAN ISLANDS

ALASKA

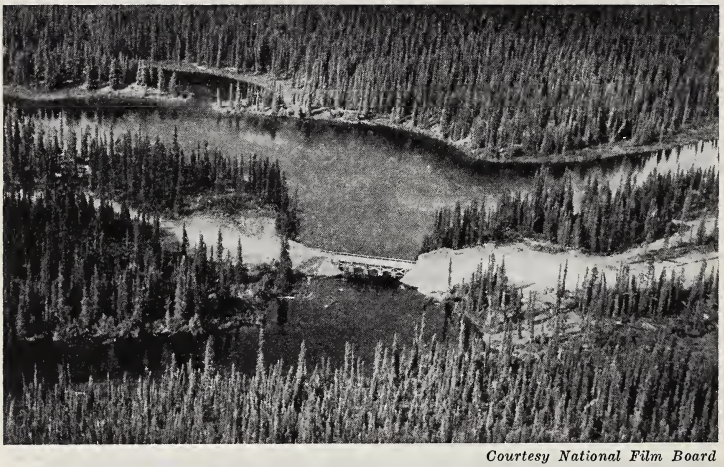
Alaska was purchased by the United States from Russia in 1867 for the sum of $7,200,000. At that time there was much criticism of the price. Opponents of the measure called Alaska a frozen wilderness, a dreary waste of glaciers, icebergs, white bears, and walruses. But Alaska has yielded to date, in fish, furs, and gold, well over $150,000,000 of wealth. The revenue tax on the seal skins alone has brought the Government of the United States more than the purchase price, and the timber resources remain, as yet, practically untouched.

Alaska comprises an Arctic region stretching from the Rockies to the Pacific, and from latitude 60° to latitude 70° N. This district is as large as Norway, Sweden, Finland, and a part of northern Russia. However, the population of the two regions is remarkably different, and the question naturally arises: will Alaska and the Yukon Territory ever have a population equal to that of Norway, Sweden, and Finland?



Alaska and Yukon.

The Yukon Valley.—The outstanding feature of the Alaska region is the Yukon River, whose fan-shaped lake sources lie in northern British Columbia and the Yukon Territory. For over 1,700 miles the river flows through the plain between the Brooks Range and the Alaska Mountains, a wide, turbid stream, until it empties, by delta mouths, into the Bering Sea, which it has partially silted up. Large as the Yukon River is, it is of little value as a highway of traffic through this vast land. The freeze-up comes early in the fall, and it remains locked in ice for eight months. Towards the end of April the rains and the melting snows flood over the ice which,



Courtesy National Film Board

An aerial shot of the Alaska Highway depicting some of the spruce-wooded country through which it passes.

at length, goes out with a rush. The huge cakes carry everything before them in their mad career down stream. At a narrow part of the river a jam may occur. Then the ice piles up, the water is held back, and floods the low-lying plain for miles on either hand. When the jam breaks, through pressure from behind, huge cakes of ice remain stranded among the willows far from the river bed. It is said that each Dawsonite is in the habit of 'snaring' a particularly huge cake and 'anchoring' it in his back yard, where it acts as a refrigerator during the summer months.

Near the mouth of the Yukon, and around the coast to Point Barrow, a few thousand Eskimos have always lived. They relied mainly on fish, seal, and walrus for their living, though hunting inland during the summer for the caribou, whose hides provided

them with the strong warm clothing which the climate requires. About 1890 their hunting failed, and the United States Government, in an endeavour to help them, introduced a few thousand reindeer from Asia. Siberians and Lapps were brought in to teach the Eskimos how to care for the reindeer. The experiment has proved to be a success. By 1905 the reindeer had increased to 10,000 head. Today there are over 500,000 reindeer in the wide plains of the lower Yukon. In Alaska there are almost 200,000 square miles of natural grazing lands, capable of herding approximately four million head of reindeer. A slaughter-house has been built at Nome, and thousands of carcasses are now shipped each year to Seattle. Reindeer meat from the Alaskan tundra is helping to feed the growing population in the large centres of the Pacific north-west. Cheap transportation is the problem which must be solved and this may be accomplished by the new Alaska Highway.

When drought ruined the wheat crop of the Middle West and turned Kansas into a 'dust bowl', the United States Government tried to help the ruined farmers find new homes. Some were sent to Alaska where the majority settled either in the Matanuska Valley near Anchorage, or in the Tanana Valley near Fairbanks. There they raise hardy vegetables and carry on dairying. A butter factory, a cannery and a meat-packing plant make use of surplus produce.

During the second World War Alaska and the adjacent Aleutian Islands were often in the news. The United States has a naval and an air base at Dutch Harbour on Unalaska, one of the Aleutian Islands. Other large air bases were built at Fairbanks and Anchorage.

Fairbanks, at the end of the Alaska Highway, became an important town overnight. Its population expanded very rapidly during the second World War, and many remained after the war to make a permanent home in Alaska, feeling that the country had great possibilities for future development.

The Alaska coast.—The mountains of the Coast Range tower up from the sea and leave a narrow, steep coastal plain. The inlets and bays which flood each glacial gorge are deep, winding, and sombre. The climate of the coast is remarkably mild when one considers the latitude. Similar conditions are found along the Norwegian coast. The prevailing winds are from the west and carry the sea temperatures to the land. The winter season brings a heavy snowfall; spring and fall have heavy rains; the summer is cool and showery. The common belief that the Japanese current

warms these shores is true only in the degree that the Kuro Siwo pours a flood of warm water into the North Pacific. Cold currents from the Bering Sea and ice-cold streams from the mountains bring the temperature of that ocean to an average of 50° F. The west wind drift carries on the circulation of the North Pacific, and the temperature of the ocean water shows little change until well south of San Francisco, where readings of 60°F. are found.



Courtesy C.N.R.

THE WATERFRONT AT JUNEAU, ALASKA.

The maritime climate permits a dense forest of spruce and fir. From Prince William Sound eastwards, the timber line gradually rises to 2,500 feet at Cross Sound, latitude 58°, and to about 5,000 feet in southern British Columbia. Above timber line the heavy snowfall forms glaciers which, north of 54 degrees, wind their way to the sea where small icebergs break from their projecting snouts. Each summer, passenger vessels make the trip along this coast, so that thousands of people have seen the blue-green ice rivers pushing their broad fronts into the sea. The Alaska coast forest lands are said to contain 200,000,000 cords of pulpwood. When the more accessible forests farther south have been used, we may expect to see pulp and paper mills in sheltered harbours around the great Alaskan bight. Over fifty million board feet of lumber are cut annually.

At present the chief industry of this coast is salmon fishing. Each spring vessels are fitted out in Seattle and go north to the canneries. They carry employees as well as tins and gear. The canneries spring into life; the Indians come from afar and set their nets for the salmon which ascend the rivers in countless thousands to spawn. More than a hundred canneries process yearly about three-fifths of the salmon catch of the Pacific Coast of North America. In the fall the ships take back the cases of canned salmon, and the buildings are locked up for the winter.

The Pribilof Islands are the home of the fur seal. At one time so many of these animals were being killed that, like the sea otter, the species was in danger of becoming extinct. Fifty years ago over 2,000,000 seals frequented these island rookeries each year. In 1911, when the number had been reduced to 127,000, the United States, Japanese, Canadian, and Russian governments made a treaty which protected the seal, and today the Pribilof rookeries contain about 2,000,000 of these animals during the breeding season.

During the winter and spring the fur seals roam in small groups down the Pacific shores of both continents. In the early summer the old bulls strike northward to the rookeries of the Pribilof and Commander Islands. Each bull selects a favoured spot on the beach and fights savagely with any intruder. The cows arrive a few weeks later, and each bull gathers around him as large a harem as he can. The young males are driven inland. Along the beach there is much fighting and stealing of cows, and it is said that the rocks echo and re-echo with the roaring of the fighters.

The pups are sleek, playful little fellows, and weigh about ten pounds at birth. The cows swim away for food, leaving the males on guard. Although there may be a hundred pups in one group, each mother seal can find her own offspring when she returns. By the middle of November the pups have been taught to swim, and are old enough to go on their first adventure. By the middle of December the herds have gone on their way down the Pacific, to return next summer to their northern rookery. About 60,000 young males are killed each year, and the proceeds from the sale of the pelts are divided between Canada and the United States. This is an example of wise conservation of one of nature's resources. Alaska's many fur-bearing animals produce furs worth nearly $3,000,000. About three-fifths of this revenue comes from the seals, and the remainder mostly from blue fox, beaver and mink.

Mining.—Gold-copper ores are found in southern Alaska, and mines are being operated at Ketchikan and Juneau. Coal of good quality is mined along the line of the railway which the American Government has built from Seward over the Alaska range to Fairbanks on the Tanana River. The Alaskan coal measures may be considered a reserve supply for Pacific coast industries. At present they are too far away to be of any immediate value.

THE HAWAIIAN ISLANDS

The Hawaiian Islands lie in the North Pacific Ocean, 2,000 miles west and a little south of San Francisco. They were discovered in 1778 by Captain Cook but remained an independent kingdom until 1893, when the reigning queen was deposed and a republic proclaimed. A few years later, at the request of the Hawaiian legislature, the islands were annexed by the United States and constituted the territory of Hawaii.

The harbour of Honolulu was discovered by an English sea captain, and another Britisher, John Young, is credited with the founding of that city in 1816. Captain Vancouver anchored off Waikiki beach in 1794, and, according to Hawaiian history, presented the first cattle to the islanders—a pair of long-horned Spanish. The Hudson's Bay Company maintained a post at Honolulu from 1834 to 1860. It was visited in 1842 by Governor Simpson and six years later by Chief Factor Douglas. In the wall of Honolulu's famous church is a tablet of peculiar interest to Canadians. It honours the memory of David Douglas, the botanist, after whom the Douglas fir is named. He was buried in the graveyard of this church.

The Hawaiian group includes eight important islands, Hawaii being the largest. Much of the land is mountainous, but there are plains and lowlands fit for cultivation. The soil is rich and is composed of weathered lavas from the volcanoes which caused the islands to appear above the surface of the sea.

Located within twenty-two degrees of the equator, the islands have a uniformly warm climate, and the north-east trade winds bring much rain to the windward side of the mountains. The combined influences of soil and climate have resulted in the development of great sugar plantations, financed and managed by Americans. These plantations are among the finest in the world, and irrigation has made it possible to grow cane even on the drier southern slopes. Pineapples are also grown on a large scale. They are canned and sold in many countries.



Courtesy Keystone View Co.

AN OUTRIGGER CANOE IN HAWAII.

Immigrants have come from many lands to work in the sugar-cane fields, so that today Hawaii is a land of varied nationalities.

Honolulu, (270,000) on the island of Oahu, is the capital and chief city. It is at the cross-roads of the Pacific, with steamer connection to Vancouver, San Francisco, Australia, Singapore, and Japan. More than 20,000 tourists visit the islands each year.

EXERCISES

1. Find Nome on your atlas map of Alaska. A gold rush occurred at this place some years ago. If you were to go inland from Nome today, what would you see that the gold-seekers did not imagine to be possible?

2. If you were building a cabin along the Yukon River, what precaution would you take?

3. (a) Trace the currents in the North Pacific on an atlas map. Can you account for the pieces of wood showing Chinese carving found on the beach of the Queen Charlotte Islands?
   (b) What effects do these currents have on the climate of Alaska?

4. Hawaii is considered to be of great strategic value. Why?

5. What recent industry have Alaska and Hawaii in common?


MIDDLE AMERICA
SCALE
0 100 200 300 400 500
MILES
Monterrey
Guadalajara
Mexico City
Habana
Santiago de Cuba
Kingston
Port au Prince
Trujillo
San Juan
Guatemala
Panama
Pt. of Spain
PHYSIOGRAPHIC REGIONS
Lowlands
Mountain & Basin
Tablelands
Intermont Basin
High Mountains

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MEXICO, CENTRAL AMERICA, THE WEST INDIES

MEXICO

Mexico is a large country of 764,000 square miles and a population of 25,000,000. In population it exceeds Canada and Australia, but from a commercial standpoint it ranks far below either Canada or the Commonwealth.

Mexico extends from the 30th to the 15th degree of north latitude. It is in many respects a tropical land. Yet it is not so far south but that a few thousand feet of elevation changes the climate to that of the temperate belt, and the higher mountains of Mexico are snow-clad. The Mexican speaks of the *tierra caliente,* the *tierra templada,* and the *tierra fria.* The governing factor is one of altitude.

Relief.—Two parallel ranges of the Cordillera extend southward through the country, gradually converging in the mountain knot of which Popocatepetl and Orizaba (18,701 feet) are the outstanding landmarks. This arrangement gives a simple model of narrow Pacific coastal plain, a western Sierra, a high interior plateau, an eastern Sierra, and a wider Gulf coastal plain.

Tierra caliente.—The plain which slopes to the Gulf of Mexico is a land of heat and tropical vegetation. The rainfall increases

from 40 inches at the Rio Grande to 190 inches on the slope of the Chiapas highland. The rainy season comes with the northward shift of the heat equator and the north-east Trades. The northern part of the plain is thinly inhabited, a few thousand people living around the Tampico oil-field. Lagoons and marshes extend in some places for thirty miles inland. There are no natural harbours, no railways, and no way in which to get products to a market. When pressure of population is sufficient to demand the use of this plain, the dredging of channels and the clearing of scrub will be undertaken. For the time being the mosquito is lord of the domain, and malaria is everywhere present.

Tampico is located at the mouth of the Panuco River, which affords a protected anchorage for the oil tankers. The first well was drilled in 1901 and there are now 13 refineries and plants with a daily capacity of 200,000 barrels. All are within forty miles of Tampico or Tuxpan. The oil is so heavy that it cannot be pumped through pipelines as in the oil-fields of the United States. It is necessary to transport it in barges down the river to Tampico, and store it in tanks. The greater part is exported to the United States, where it is 'topped', and the residue sold as fuel or for paving purposes. The Mexican railways are equipped to burn oil and obtain their supplies from refineries at Tampico and Minatitlan. In 1949, Mexico's production was 60,910,000 barrels. Reserves however, now total only 900,000,000. The nationalization of the petroleum resources was effected in 1938. In 1942, the Mexican government agreed to pay $24,000,000 for the rights owned by the United States oil companies, and five years later Mexico promised to pay over $81,000,000 to former British and Dutch owners of oil properties.

South of Vera Cruz the plain has a heavier rainfall and is forested. Mahogany is exported, some cedar is cut, and logwood and mora trees are secured for the dyes extracted from their wood. Sarsaparilla root and chicle, the sap of the chicozapote tree, are also exported from this region. The Gulf coast contains less than 10% of the people of Mexico. There is very little agriculture. A few plantations have been cleared, and sugar, bananas, rice, coconuts and a little rubber are grown. Minatitlan is the principal port of this section.

Yucatan peninsula is a low, flat plain composed of limestone rock. There are no rivers, since the rainfall finds its way to the sea by means of underground channels. Here and there cave-ins

have formed sinks, a hundred or more feet in depth. At the bottom there is fresh, cool water. The people live in small villages near these natural wells. The Trades sweep over Yucatan as drying winds, and the rain which falls comes in the form of tropical cyclones. This causes a scanty growth of vegetation in northern Yucatan. The increase of precipitation in southern Yucatan causes a dense forest which extends over the base of the peninsula. On the dry area the grazing of cattle, sheep, and goats is carried on. Henequen, or sisal, is the chief crop, and is grown for its fibre. About 50% of the world's supply of this valuable product comes from Yucatan. It is sold to the United States and Canada where it is used in making binder-twine. Progreso has short rail lines running back to the sisal plantations.

Yucatan is inhabited by remnants of the ancient Maya civilization, whose abandoned and ruined cities in and near the tropical forest are the wonder and admiration of the traveller.

Vera Cruz (75,800) is the largest and most important of the Mexican seaports. Its population indicates that there is much truth in the statement: 'After the fashion of Trade-wind ports, it contains only those who *have* to be there.' Sugar is produced from the adjacent plantations, and is the chief product of the Vera Cruz district. The principal trade route into the interior of Mexico leads westwards across the plain to the flank of the Sierra Oriental. It was a difficult matter to find a route through the mountains, which are a barrier to the free flow of trade between the plateau and the coast.

As the train climbs to the plateau every type of vegetation is seen, from the sugar-cane of the plain to the pine forest of the high mountain-sides. The valley-sides are dotted with palm-thatched huts, standing in the midst of small gardens, where bananas, plaintain, corn, and vegetables are growing. Farther up is the dark green shrubbery of the coffee zone and more palm-thatched cottages. The city of Orizaba is the largest in the Sierra, and stands in a fertile valley at 4,000 feet elevation. At this height the people are not troubled by mosquitoes, and there is no malaria. There are large cotton mills, and Orizaba has been called the 'Manchester of Mexico'. Between Orizaba and the summit the villagers grow corn, beans, tobacco and potatoes. Similar valleys exist throughout the Sierra Oriental. Each of them is well populated and carefully cultivated.

The interior plateau of Mexico is 900 miles long and 300 miles wide. The northern part averages 4,000 feet in altitude, but rises towards the south, where the elevation reaches 8,000 feet. The

surface is comparatively flat, with many wind-blown slopes and wide areas of loose rubble. Much of the plateau is composed of soil derived from weathered volcanic ash and needs only water to yield abundant crops. Almost all of it is an area of inland drainage. The streams which drain the mountain slopes form shallow lakes during the rainy season, only to shrink and turn into areas of mud and alkali during the dry season. There are hundreds of these *salinas* in the plateau; the largest is found in the Torreon district, where the chief cotton of north-eastern Mexico is grown.

The rainfall of the plateau is low since the encircling mountains strip the winds of their moisture. In northern Mexico little but sage-brush grows on the dry and dusty plain. Evaporation is rapid in this latitude, and it is fortunate that the rains come during the summer months, June to October. Cattle-ranching is the main industry outside the irrigated lands near Torreon. Storage reservoirs are being built and much is being done to extend irrigation and develop hydro-electric power. Artesian wells might also be used. However, a stable government is necessary in order that these developments may be made.

Mexico City and district have more rain, the land is fertile, and there is a population of 1,974,000. Many large *haciendas* are found throughout the plateau where the land is apportioned among the Spanish creoles, whose ancestry dates back to the days of the conquest.

At one time some of these estates comprised a million acres, and Mexico took one back to feudal times when the lord of the manor dispensed justice from his dais in the great hall of the manor house. The house of the hacienda with its numerous outbuildings was the focal point for the whole countryside. It presented a romantic appearance, with its barred windows, massive doors, and thick stone or clay walls. The cowboys, with their tough Mexican ponies, silver mounted saddles and broad-brimmed, high-topped hats can still be seen on every hand.

But the large estates have to a great degree been broken up as a result of agrarian reforms since 1920. The lands have been granted or restored as village communal land to over six millions who owned no land before. Agriculture is still in most parts primitive. Irrigation ditches bring water for the gardens and small vineyards. Wheat and corn are grown chiefly for the local needs. Very often a wooden plough is seen in use; grain is still cut with a cradle and threshed by treading out with oxen. Corn bread, made from the coarse flour ground in hand mills, and beans, are the chief food of the peon.

The lot of the peon has gradually improved. In 1910, 78% of the people were illiterate, but in 1942 only 50% were illiterate. No longer is the Mexican peon the virtual slave that he once was, and he is beginning to learn more of the world beyond his native village.

The inhabitants consist of three racial types: the Indian, descended from the ancient Nahua and Aztec civilization; the mestizo, who is a mixture of Indian and Spaniard; and the white people, who are of Spanish descent. Spanish is the official language of Mexico.

Mining is the chief industry of the Sierra Occidental. Mexico produces some 40% of the world's silver. Mexico is said to have more mineral wealth per person than any other country in the world. The Guanajuta vein was discovered in 1525, and for three hundred years furnished one-fifth of the world's silver output. These mines are still being worked. Near Durango is a hill of iron ore which is mined for local use. The most important smelting centre is at Monterrey where there is also a steel plant and a brass foundry as well as factories producing flour, shoes, cement, tile, electrical equipment and hand-blown glass. Copper, lead and many other minerals are also mined in the Sierra Occidental.

Mexico's largest cities are found on the interior plateau. Mexico City is probably the oldest city in America since it is believed that the Aztecs built a city here in 1325. Today it has a population of over two and a quarter million and is growing rapidly. Like many parts of Mexico it is a strange combination of the very old and the very new. It has railroad shops, iron and steel mills, aeroplane factories, and many industries which process the raw products of Mexico.

Guadalajara, the second largest city, has cotton mills, flour mills, and many other industries which process the raw products of the densely populated farming area of which it is the centre.

In addition to its large manufacturing plants, Mexico has many cottage industries employing small numbers of workers. Many of these produce the various hand-made articles for which Mexico is famous: hand-blown glass of various beautiful colours, embroidery and lace, shawls, pottery, leather work, silver and other metal work.

Mexico is making a great effort to improve her means of transportation and now has many fine paved roads. The Pan-American Highway has been completed from the United States border to San Cristobal de Las Casas in the Isthmus of Tehuantepec.



Courtesy Keystone View Co.

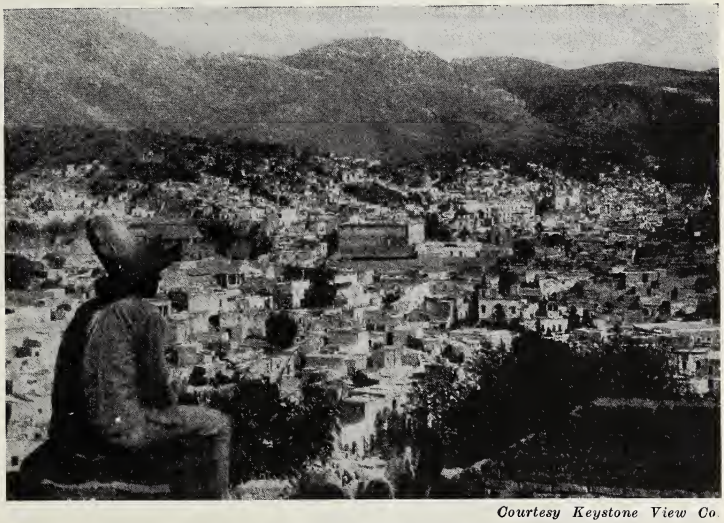
MEXICO CITY.

The western coastal plain is narrower than the Gulf plain and much drier in the north, where the Sonoran desert stretches along the coast opposite the peninsula of lower California. From the Colorado River to the Yaqui River, a distance of 500 miles, no stream reaches the sea. Irrigation is possible in a few places, and early fruits and vegetables are grown for northern markets. The copper mines of this section are the main source of wealth. Mazatlan is the commercial centre. South of San Blas the rainfall increases to over forty inches and we find forests of cedar, mahogany, and dye-woods, as on the Gulf plain. Narrow, steep-walled river valleys, cut into the side of the Sierra, provide areas suitable for agriculture. The plantations are widely spaced and there is no railway connecting one with another. Trade is by small coasting vessel. Sugar-cane, cacao, tobacco, and rice are the chief products. The west coast is coming to be known as a resort centre. The beautiful city of Acapulco is the best known of these resorts.

The Tehuantepec isthmus.—South of Popocatepetl the mountains descend to the isthmus and give a low pass from Atlantic to Pacific, through which a railway has been built. The rainfall reaches a maximum of 200 inches in this region and there is a particularly dense tropical forest. Vanilla beans are grown for export. South of the isthmus, the highland of Chiapas contains fertile valleys, and, in the higher portion, there are good grazing

lands. Its population is of native Indian stock, and there is little trade with the outside world. Coffee is the chief money crop, and is brought to market by mule train down the winding trails which pass for roads in this part of the world.

Modern Mexico.—Long a backward country of ignorant persons and crude subsistence agriculture, Mexico is rapidly changing. Large land holdings have been broken up into small peasant farms and irrigation projects have been established. The supply of good land, however, is limited and attention is now being given to soil conservation methods in order to increase crop yields. Despite



Courtesy Keystone View Co.

GUANAJUATO, MEXICO.

the dominance of agriculture, the mining industry produces most of the export commodities including silver, gold, copper, lead, zinc, mercury and petroleum. Traditionally an exporter of raw materials and an importer of manufactured goods, Mexico is now being rapidly industrialized. Light industries are being centralized and improved to produce textiles, clothing, shoes, beverages and cigarettes for the Mexican market. Mexican coal and iron ore are being used to produce steel for the making of machinery. Mexican cities are expanding rapidly in order to house great numbers of industrial workers.

CENTRAL AMERICA

The continuation of the Cordillera south of Mexico is known as Central America. This region includes the republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica and Panama, and the crown colony of British Honduras. The mountain ranges lie near the western side, and slope steeply to the Pacific. Fairly wide plains slope down to the Caribbean, and a few of the rivers are navigable for some distance inland, but sand-bars along the coast make navigation a constant danger to the would-be trader. Earthquakes are common throughout the mountain region, and some of the higher cones are active volcanoes.

The eastern lowlands have a heavy rainfall, a few places recording 195 inches per annum. The heat, the rain, and the rank vegetation make the eastern plain a dangerous place for the white man. For this reason the majority of the people live in the valleys and the plateau lands, where the rainfall is moderate and the temperature is mild and agreeable. The tropical forest contains mahogany, cedar, rosewood, and ebony. Pine and oak grow in the plateau region. The economic importance of the Caribbean plain lies in the banana plantations. Large fruit companies, with an investment running into millions of dollars, have secured thousands of acres of land. Company-owned steamers call for the fruit, load at the company wharf, and sail away to New Orleans with cargoes of as many as 70,000 bunches.

The driving force is the white man, brought from the north and full of the energy of that cool climate. The labour is negro, Indian, or mestizo, races inured to tropic heat and moisture. The white employees, the clerks, inspectors and overseers, have regular vacation periods which they spend in the north, and there renew their health and vigour. The home holiday is as yet a necessary part of the exploitation of these lands.

Constant production of one crop over a large area eventually brings plant disease, and the banana wilt has caused heavy losses to more than one plantation. The soil becomes exhausted, and it does not pay to use rotation of crops and ploughing in of cover crops. When the banana field 'runs out' it is abandoned. The little tram-lines are taken up, and even the houses and wharf may be removed. The jungle returns to its own, and in three years' time it is difficult to tell where the field once stood. After some years have elapsed the original area may be again cleared and planted. In the meantime the company is busy on another location. In order to operate over a period of years a banana company

needs at least three times as much land as is under crop at any one time.

Outside the plantations the rural population is small and malaria is prevalent. It may be that the conquest of malaria is the key to the main difficulties in securing a well-populated Caribbean plain, and a healthy, contented, and prosperous citizenry.

The upland region is the part of Central America ranging from 3,000 to 7,000 feet in altitude. Here the people live in a mild climate with a moderate rainfall, the dry season lasting from November to April. Some parts of Guatemala have dry, elevated range land. Throughout these highlands the land is divided into small holdings among the native Indian owners. There are a few large estates owned by Spaniards. It is the land of corn, beans, squash, and coffee. The former comprise the people's food; the coffee is the product which they sell.

It has been proposed to build a canal across Nicaragua, using the San Juan River and Lake Nicaragua, which is a hundred miles long and forty-five miles wide. The project will probably wait until the Panama Canal is unable to handle the traffic which offers.

As in South America, and in the far north of Canada, the aeroplane is bringing a new life to the republics of Central America. Places inaccessible before are now within easy reach of the cities of Mexico and the southern United States. Wealth in minerals and agricultural products can now be brought to seaports for export to other countries. These exports are bringing a new source of wealth to the natives.

During the second World War the unfinished portions of the Pan-American Highway were completed through all the Central American Republics, with the help of the United States. This road and other roads and railroads connecting the towns on the plateau with the chief seaports, have helped to bring prosperity to these countries.

Crops, not previously cultivated, are now being grown successfully. Among these are plantation rubber, on the steaming Caribbean coast, sisal hemp and abacá, or manila hemp, tobacco and cotton on the plateaus or in the many mountain valleys. Forest products, like cabinet woods, dye woods or chicle, are being produced for export. From El Salvador comes most of the balsam (used for medicinal purposes) in the world. El Salvador has also a variety of minerals; silver and gold, copper, lead and zinc.

Some of the capital cities—Managua, Guatemala City, Tegucigalpa and San José, are beautiful, modern cities with busy air-

ports. Most of the governments are making efforts to educate their people and to teach them sanitation and better methods of agriculture. Further improvement in transportation, the development of hydro-electric power and the introduction of air conditioning in factories and public buildings, should bring about remarkable development in these previously backward republics.

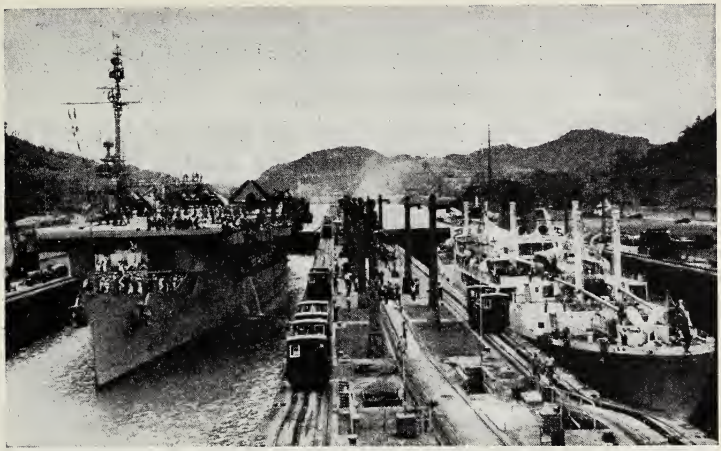
THE PANAMA CANAL

The first attempt to build a canal across the Isthmus of Panama was made by the French engineer De Lesseps in 1881. After eight years of effort the enterprise was abandoned, owing to the prevalence of malaria and yellow fever. It is safe to say that the canal would never have been built if ways of conquering the yellow fever had not been found through the discovery that the *stegomya* mosquito carried the infection from a patient to a healthy person. Success in the building of the canal may be said to have depended upon the control of a mosquito. So effective was the work of the sanitary engineers and the medical board of the canal zone, that no case of yellow fever has occurred there since 1905. By the time the canal was completed the zone had a better health record than many of the prosperous cities of the United States and Canada. The chief credit is due to Major-General Gorgas, who had control of the sanitary department.

Construction of the present canal was begun in 1904 by the Government of the United States, and the first ship passed through on 15th August 1914. The canal cost $375,000,000, and ranked at that time as one of the greatest engineering feats in the world. The United States paid Panama $10,000,000 for the canal zone, a strip of land five miles wide on either side of the canal and 553 square miles in area. A rental of $250,000 per annum is paid.

A Trip through the Canal

A ship from Vancouver to Liverpool, carrying grain from our western prairie, steams southwards to Panama Bay, 4,000 miles, and enters a small estuary, which leads inland some eight miles to the Miraflores locks. The locks are in pairs, side by side, so that a vessel may ascend while another vessel is descending. If one lock should break, traffic through the canal would not be blocked. The locks are 41 feet deep over the sills, 110 feet wide, and 1,000 feet long, and can accommodate all but a few of the largest vessels afloat.



Courtesy Wheeler Newspaper Syndicate

A U.S. Navy Carrier and a British Merchant Ship pass each other in the Panama Canal, illustrating its dual function for defence and trade.

At Miraflores our vessel goes up two steps to a small lake. Crossing this lake, one and a half miles, it ascends one step by means of the Pedro Miguel lock, and enters Gaillard Cut. It is now eighty-five feet above sea-level. Gaillard Cut is 500 feet deep, seven miles in length, and cuts through the backbone of the Cordillera. It is the only part of the canal that has given any trouble. The soft nature of the soil has caused slides, and a filling-up of the bottom of the cut. Further dredging has given the sides of the cut a more gentle slope, and there has been no interruption for many years.

From Gaillard Cut the ship enters Gatun Lake, 164 square miles in area. It is thirty-two miles across the lake to the Locks, where our ship goes down three steps to Limon Bay. Gatun Lake has been formed by damming the Chagres River. The dam is 8,400 feet long and 2,100 feet wide, with a large spillway to carry away excess flood waters. The lake supplies water for the canal locks. The total length of the canal is 43.84 miles. The average time of passage by a vessel is about eight hours, the record time is four hours ten minutes. In 1948, 4,678 vessels with a total tonnage of over 24,000,000 tons, passed through the canal. All ships passing through the canal are required to pay a toll except the government ships of the republics of the United States, Panama and Colombia.

The saving in time and mileage is indicated in the following:

Vancouver	to Liverpool	via Cape Horn	16,476	miles
"	"	" Suez	15,533	"
"	"	" Panama	8,603	"

The opening of the Panama Canal has made the port of Vancouver. The route through the canal is a deciding factor in the shipment of grain, lumber, and canned fish to European markets. It has also presented similar advantages to New York and New Orleans. New York via Panama Canal is 1,800 miles nearer Japan than is Liverpool, and is 1,600 miles nearer Shanghai, and 2,400 miles nearer Sydney, Australia. New Orleans is 2,600 miles nearer Callao than is Liverpool, and Gulf ports of the United States are increasing their trade with the Pacific states of Latin America.

THE WEST INDIES

The chain of islands which extends from the Bahamas to Trinidad is the top of a partially submerged mountain ridge which bends to the west to meet the Cordillera of South America at the coast of Venezuela. The islands enclose the Gulf of Mexico and the Caribbean Sea. The islands of Japan and the East Indies have been similarly formed. The East and the West Indies are alike in other respects; both are within the tropics, both have high mountains and active volcanoes, and both are subject to earthquakes.

The West Indies have a true Trade-wind climate. The wind blows from the north-east day after day, mild and warm; it is never cold. The temperature graph for the year shows that there is little variation between summer and winter.

Tropical diseases have been almost stamped out in the islands of the West Indies. The dreaded yellow fever is under control, and there is now little malaria, dysentery, and hookworm. The population is largely negro, descended from slaves brought over from Africa between 1600 and 1800. It has been estimated that over 2,000,000 slaves have been landed on these islands since the slave trade began. On some of these islands the white population numbers less than 2% of the inhabitants. The larger islands contain descendants of the Spaniards, French, and English, who first colonized this part of the New World, and there is a moderate proportion of mestizos, or people of mixed racial strain. The original Carib Indian has disappeared.

The eastern or windward sides of the islands have a heavier rainfall than the western or leeward slopes. This variation may range from 150 inches to 20 inches. There is also a wet season

and a dry season, or we may say a period when there is less rain. The dry season lasts from December to April as in Central America. Five months of dry weather in a land within the tropics with a hot sun, nearly vertical, limits production on the lee side to those plants which may be grown during the season of rains, and to shrubs and trees which have the ability to live through the season of heat and drought. Each island shows a marked difference between the products grown on the windward side, and those on the leeward slope.

The Greater Antilles consist of Cuba, Hispaniola (Haiti and Dominican Republic), Puerto Rico, and Jamaica.

Cuba, the largest of the West Indies, has an area of 44,000 square miles and a population of 4,500,000. The mountains are of moderate height, 3,000 to 4,000 feet, and are forested. Wide limestone plains slope gently to the sea. The plains are devoted to the growing of sugar-cane to such a degree that the island produces more sugar than any other country, and has been called 'the world's sugar bowl'. Molasses, a by-product of the cane, and rum are made in large quantities.

Tobacco is grown in western Cuba in a district about ninety miles long by ten miles wide, where the soil is particularly suitable. A large amount of leaf-tobacco is exported to Key West and there made into cigars in order to avoid the high duty on manufactured leaf.

Iron ore is mined by steam shovel from hills near Santiago. Baltimore imports much of this ore. Cuba has few other minerals.

Grape-fruit, tomatoes, and pineapples are exported to United States markets before the Florida fruit is ready.

Havana is the largest city in the West Indies. It is a city of wealth and distinction, where many sugar barons maintain expensive residences. It is the financial, commercial, and administrative centre of the whole island. There are fine hotels, stores, beautiful parks and playgrounds, and a deep, landlocked harbour. Rail lines radiate to all parts of the island. Spanish is the official language of the country.

Hispaniola has an area of 30,000 square miles. It is traversed by four mountain ranges with wide lateral valleys intervening. At least 75% of the area is forested, and it is surprising to find that the population amounts to 3,750,000. The area which is under cultivation is densely populated.

The island is at present under two governments. The western part is called Haiti; the eastern part, the Dominican Republic. The United States was in actual control of Haiti from 1916 to 1930, and of the Dominican Republic from 1916 to 1924. During those years there was a marked advance in the building of roads, in sanitation, and in production.

Tobacco and sugar-cane are grown in the lowlands, coffee and cacao on the hill-sides. The northern coastal plain is wet and humid from the in-blowing Trades. The negro farmers live in small cleared patches, where they grow bananas, plantain, cassava, sweet potatoes, and corn for food, and coffee and cacao for market. The northern slope of the island is densely populated. Pine forests cover the central mountain ridges. The southern plain has a wet and a dry season, which causes a dense growth of jungle grasses and vines. Some of this has been cleared away and sugar-cane planted.

The city of Santo Domingo was founded in 1496 by Bartholomew Columbus. It is noted for its large cathedral and old Spanish fortifications. It is the Government centre for the eastern end of the island.

The shores of the large bay on which Port au Prince is located are thickly populated. Much sugar is exported from this section. Haiti contains two-thirds of the total population of the whole island but the Dominican Republic is more progressive. Port au Prince is the capital and the largest city. The principal exports of Haiti are coffee, cacao, sisal hemp, and cotton; of the Dominican Republic, sugar, cacao, tobacco, and coffee.

Puerto Rico has an area of 3,421 square miles and a population of 2,250,000, making it the most densely populated island of the Greater Antilles. The central part is mountainous, and the northern and eastern sides have a heavy rainfall. The southern slope, in the lee of the mountains, has an average of forty inches, which comes during the summer months. The sun, at the low latitude of 18° N, is hot even in winter and dries the ground out; the streams dry up, and grassy plains provide a contrast to the rain-forest and jungle of the windward side of the island.

The population is almost entirely agricultural, and from that standpoint has about reached the point of saturation. The homes and gardens of the Puerto Ricans line the northern slopes of the island from base to top of the mountains. Probably nowhere else is a steeper hill-side agriculture to be found. Good roads have been built through the plains and valleys, but thousands of the

natives transport their produce from farm to market on the backs of donkeys over narrow trails.

The plains are devoted to growing sugar-cane. On the north side the land is drained by ditches to carry off the excess water. On the south side irrigation flumes bring water down from reservoirs in the hills. Tobacco is grown in the interior valleys, much of it under cheese-cloth, in order to get a fine leaf suitable for cigar wrappers. Coffee is grown on the mountain slopes. Grape-fruit, oranges, and pineapples are exported to United States markets. San Juan is the largest city, having a population of 210,000.

The majority of the people of Puerto Rico, however, cannot be considered as well-to-do in spite of the large export trade. Thousands are employed as labourers on the sugar plantations, other thousands on the tobacco fields, while still other thousands help with the coffee crop, and then drift down to help in the cane fields. Wages are low. The food of the labourer is mostly rice, beans, and chick peas. Once or twice a week some salt codfish or a bit of meat is eaten. The independent owner of a few acres will eat beans, plaintain, corn, and sweet potatoes. He will have a goat which will provide milk and cheese for the children. The plantation owners have the wealth and leisure to live in fine homes and to travel to distant lands. This seems to be the general situation throughout the tropical lands of Mexico, Central America, and the West Indies. Where nature is so kind it is not necessary to struggle, and many are content to drift along with a few clothes and enough to eat. If to this attitude we add the fact that Puerto Rico supports a population of over 600 per square mile, it will be seen that opportunities to get ahead are none too many.

Absentee landlordism, as practised by United States financial interests owning large sugar plantations, contributed much to the general unrest. It is unfortunate that those who reaped the profits of the rich lands did not always assume sufficient responsibility for the welfare of those people whose labour made such benefits possible. For this reason large holdings by corporations have been limited to 500 acres. Holdings in excess of this amount are being taken over by the Government and redistributed. During the last decade great improvements have been initiated by the Government for the people's welfare. Education has been made free and compulsory and the educational system is now credited with being one of the most efficient in Latin America. The completion of the Coonillas Dam in 1948 is a step in the hydro-electric power development programme, to assure the success of manufacturing

industries in the towns and cities, where one-third of the population dwells.

Jamaica resembles Puerto Rico in general, but is larger, having an area of 4,450 square miles and a population of 1,530,000. The island is under British rule. Mountains lie close to the northern shore and the coastal plain is given over to the growing of bananas to a marked degree. In fact, Jamaica leads the other islands of the West Indies in the export of bananas just as Cuba excels in the production of sugar. Oranges and grape-fruit are also grown. Sugar-cane plantations are found on the southern slope of the



Courtesy United Kingdom Information Office

IN A CIGAR FACTORY IN JAMAICA.

island. Coffee, pimento, logwood, cacao, coco-nuts, rum and ginger root are other products. Jamaica produces most of the world's supply of allspice. The guinea grass that grows to a height of four to six feet is superior to any other for pasturage, and cattle raising is becoming an important industry.

The people of Jamaica have developed a number of small industries which bring in a steady return, and there is a fair degree of prosperity throughout the island.

Bauxite has been discovered on the island, and is being processed into alumina, for the aluminum works being built at Kitimat in British Columbia.

Kingston, on the southern shore, has a fine harbour and is a port of call for vessels bound through the Panama Canal. The last census gave 14,476 white people in Jamaica. The majority of these live in Kingston. The rest of the inhabitants are negroes, with a few East Indians and Chinese. The Jamaican negro is proud of his birthplace and proud of his education. There is a constant emigration of the young men to work in the sugar plantations of Cuba and Central America, where they are noted for their ability to work and their trustworthy character. This is probably the most valuable export from the island, and speaks well for the success of British rule since 1655.

The Bahamas are the oldest British colony and consist of a group of 700 islands and over 2,000 cays, a cay being an island too small to warrant the geographical term 'island'. Extending for 760 miles from the coast of Florida to the coast of Cuba, the Bahamas have a total area of 4,424 square miles and a population of 82,000. Nassau, the capital, is on New Providence Island, and has air line and steamship connections with all parts of the world. In 1952, a total of 84,719 tourists visited the Islands, acclaimed as the most popular all-year-round vacation land.



Courtesy Nassau Development Board

BAY STREET

Main thoroughfare and shopping centre of Nassau. Note the native market in the foreground where visitors may buy articles made from straw and sisal.

The Bahamas are composed of limestone with a thin, but very fertile, soil covering. Early tomatoes are grown in large quantities and are an important export to the United States, Canada and Great Britain. Sisal, used for straw work, souvenirs, and household products, is grown on many of the islands.

Among the native fruits are: Avocada pear, bananas, breadfruit, 'jelly' coconuts, guava, mangoes, melons, oranges, lemons, limes, papaya, and pineapples.

The Lesser Antilles.—These islands stretch in a huge 800-mile curve between Puerto Rico and Trinidad, and are divided into two groups, known as the Leeward Islands and the Windward Islands. Nearly all are mountain peaks rising above the sea, and, small as they are, present the same climatic features which have been noted in the description of the larger islands of the Greater Antilles — that is, a wet windward slope and a comparatively dry leeward plain.

The Leeward Islands.—St. Thomas, St. John, and St. Croix, comprising part of the Virgin Island group, were purchased by the United States from Denmark in 1917 for the sum of $25,000,000. This was a high price for a few square miles of tropical island, but the completion of the Panama Canal created their value as a coaling station and strategic base controlling this trade route. The rest of the Virgin Islands belong to Great Britain, and number thirty small islands. Bay oil extracted from the leaves of the bay tree is the chief product of the whole group. Mixed with alcohol, this becomes the bay rum of commerce. The town of Charlotte Amalie, on St. Thomas Island, is the only commercial centre.

St. Kitts, Antigua, Montserrat and **Dominica** are important British possessions of the Leeward Group. The lime tree grows wild on the hill-sides, and lime juice is the important export. There is a small trade in cacao, tobacco, cotton, onions, pineapples, and bay oil.

Guadeloupe belongs to France, and is the largest of the Leeward Islands. In an area of 688 square miles there is a population of 304,209, which is 80% negro. Sugar, coffee, cacao, vanilla beans, and rum are the chief products. Pointe à Pitre is the commercial centre.

The Windward Islands are Martinique (French) and the British possessions of St. Lucia, St. Vincent, and Grenada. St. Lucia exports sugar and cacao, and lesser quantities of lime juice, bay oil,



Courtesy United Kingdom Information Office

An array of village-made baskets in the market place at St. Georges, Grenada

molasses, vanilla beans, nutmegs, and cloves. St. Vincent is a volcanic island with many high ridges. The soil is fertile and produces the best long-staple, sea-island cotton in the world. It is also noted for its arrowroot, a form of starch used in the manufacture of chocolate. The production of arrowroot for world trade is the staple industry of St. Vincent, and in favourable years about 5,000,000 lbs. are produced. Copra, sugar, molasses, rum, cacao, peanuts, and spices are other exports.

Grenada has a population of nearly 600 to the square mile and produces cacao, nutmegs, and mace.

Barbados, with an area of 166 square miles, lies a hundred miles east of the Windward Group, and boasts of a population density of 1,220 to a square mile, which is the greatest, for a purely agricultural area, in the western hemisphere. The island consists of a number of limestone terraces, nearly every acre of which is fertile, arable land. One-third of the area is devoted to sugar-cane.

Each family has a garden in which are grown bananas, plantains, beans, onions, squash, yams, and cassava. The food purchased in the market consists of fish, flour, or a little meat. The poorer class lives almost entirely on a vegetable diet. There is little real poverty, and yet little margin at any time over and above the actual necessities of life. Barbados has reached the point of satur-

ation, and there is a constant emigration to the cane fields of Central America, and to the other islands of the West Indies, where the pressure of population is not so great.

Trinidad, ceded to Great Britain in 1802, has an area of 2,000 square miles and a population of 500,000. Lying off the mouth of the Orinoco, it has a tropical climate. The possession of a pitch lake, 114 acres in extent, is the basis of Trinidad's prosperity. The lake has been worked for fifty years, and shows little sign of depletion. The oil wells up from some large subterranean deposit, and hardens upon contact with the air. A number of bores have been put down near the lake, and now petroleum is the major source of revenue. These wells may in time exhaust the underground supply, and then there will be no more pitch lake. Trinidad is the largest producer of petroleum within the Empire producing 22,000,000 barrels per annum.

There is a large British Indian population, numbering 127,000. These people have been brought in to work on the sugar and cacao plantations. It is the largest settlement of people from India in either North or South America. Cacao, sugar, coco-nuts, grapefruit, molasses, and rum are the principal products of the soil.

Port of Spain, the capital and chief port, is situated on the western side of the island, and has a population, including its suburbs, of nearly 100,000. It is the one large export-import centre. Sugar and cacao estates are located nearby. In addition, a large share



Courtesy Bermuda News Bureau

Bermuda buildings are made from blocks of coral stone cut from the hill-sides of the islands.

of the Orinoco River trade is carried on through Port of Spain. Its relation to the Orinoco is similar to that which Hong Kong bears to southern China and the Si Kiang valley. In proportion to its population, Trinidad is one of the wealthiest islands of the West Indies.

The Bermudas.—The Bermudas are a group of small coral islands lying 677 miles from New York in the Atlantic Ocean. Their combined area is slightly less than twenty square miles, but they support a population of 32,451 making them one of the most densely populated regions in the world. They are famous for the beauty of their scenery, and thousands of tourists yearly visit their shores. They are also used by Great Britain as a naval base. The transatlantic air service is bringing them into prominence as an air base. The chief products of the islands are onions, lily bulbs, potatoes, and garden vegetables. Canada takes practically all of the exports from the islands and in return sells to them various manufactured articles, flour, milk, and other food stuffs which cannot be grown on the islands.

EXERCISES

1. When the Spaniards first came to Mexico they found that the Aztecs had developed a civilization of a fairly high order. What geographical advantages of soil, climate, and natural protection, made possible the development of this civilization?

2. What financial interests have the industrial nations in Central America? What difficulties do they meet with in trying to advance these interests by developing the country?

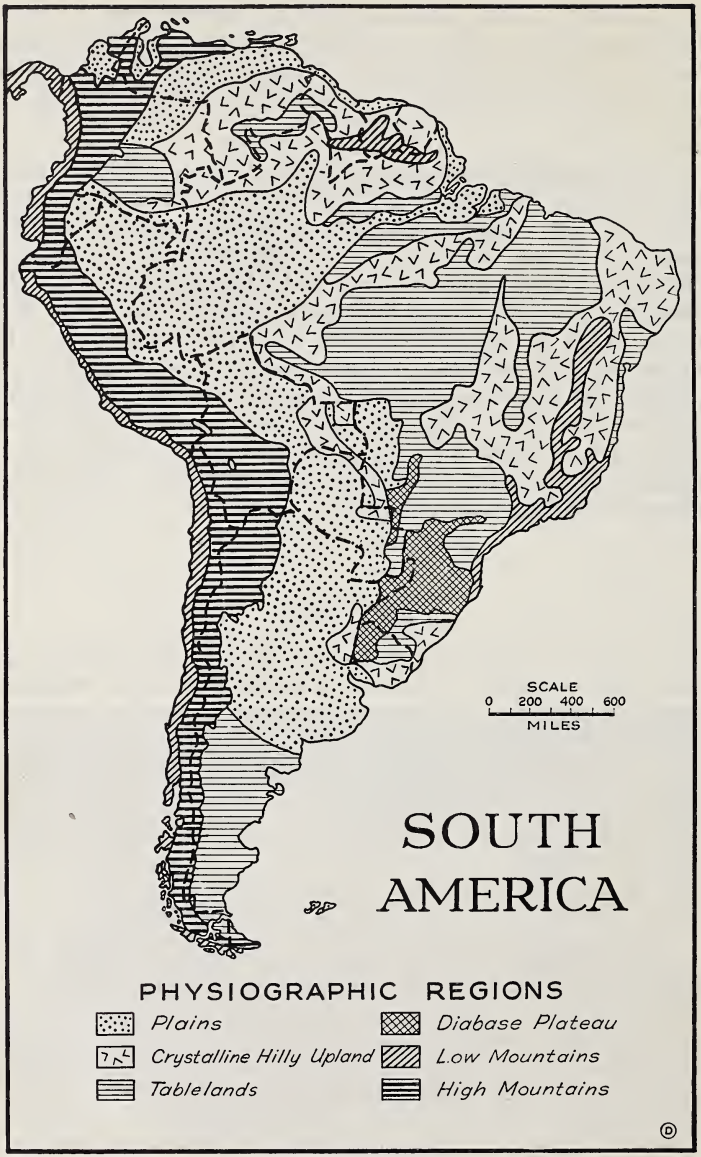
3. Of what importance is the Panama Canal to the western countries of South America?

4. Hill-side agriculture like that developed in Puerto Rico is only resorted to where necessity is great. How is it carried on?

5. Trade between Canada and the West Indies is constantly being expanded. What commodities are exchanged? Consult the *Canada Year Book*. Why are these countries ideally situated to help one another?

6. What geographical conditions make it possible for the West Indies to support such dense populations?

7. What has the invention of refrigeration meant in the development of West Indian trade? What industries has it encouraged?


SCALE
0 200 400 600
MILES
SOUTH
AMERICA
PHYSIOGRAPHIC REGIONS
Plains
Crystalline Hilly Upland
Tablelands
Diabase Plateau
Low Mountains
High Mountains

18

SOUTH AMERICA

South America has been called the model continent. There are three highlands, three great plains, and three large river systems. The atlas will show these obvious features. The shape of the continent is similar to that of North America, wide in the north, tapering towards the south. In its coast-line features South America is simple, even severe, in outline.

The larger part of the continent lies within the Trade-wind belt. Its position with regard to the Equator is the most important single geographic factor among the controls which mould the lives of those millions who wrest a living from its hills and plains. We shall now divide South America into its natural regions and study each in some detail.

THE SOUTH AMERICAN CORDILLERA

The great mountain region of South America is much higher than its North American counterpart. The Andean Range is higher and narrower than the Rockies, and there are few passes less than 15,000 feet in altitude through the western Andes. The whole highland presents a formidable barrier to trade and communication between the Pacific coast of the continent and the plains which slope to the Atlantic. The Cordillera consists of a number of parallel ranges, which now draw apart to enclose a high plateau and then draw together into a jumble of peaks which is called a mountain knot. Near the sea a lower coastal range slopes to a narrow coastal plain. These general features will become clearer as we examine the highland part by part.

VENEZUELA, COLOMBIA, AND ECUADOR

These three countries divide among themselves the northern part of the Cordillera. Three ranges, separated by narrow valleys, strike northward from the mountain knot which contains the peaks of Cotopaxi and Chimborazo. The western Andes follow the coast and descend gradually to the Isthmus of Panama. The

eastern Andes divide and send out an arm on either side of the Gulf of Maracaibo.

Throughout this region the lowlands and the coastal plains are wet, hot, and unhealthy. The majority of the inhabitants of the three countries will be found living in the higher lands up to altitudes of 10,000 feet, where the temperature is mild and the rainfall moderate in quantity.

Venezuela

Venezuela was given its name of Little Venice by Ojeda in 1499, when he saw the Indian villages built on piles around the border of Maracaibo Bay. The country has an area of 352,000 square miles and a population of over 4,000,000. The larger part of the country is comprised within the Orinoco River basin. The river rises in the Parima Range of the Guiana highland, bends in an arc to north and east, and empties into the Atlantic opposite the island of Trinidad. On its course it is joined by a number of tributaries from the Andes. The Orinoco is 1,500 miles long and drains about four-fifths of Venezuela. The delta mouth has many small channels, twisting between low, wooded islands. The main channel, although at times twenty miles wide, is shallow, with a depth of only seventeen feet over the sand-bars.

The plains north and west of the Orinoco are known as the llanos. Trees grow along the banks of the rivers and their course through the plain is marked by a strip of green. The rains begin in June and last until November.

At this time the heat equator has moved north with the vertical sun and the Orinoco valley is in the region of equatorial rain. When the rains cease the heat continues, since the llanos are only a few degrees north of the Equator. The land dries out, the plants and grasses which had grown luxuriantly wither and die. During the dry season grass fires are a menace. Stock-raising is the principal industry on the plains of the llanos.

Ciudad Bolivar is the one large town of the llanos. It is 372 miles upstream and the distributing point for a large territory. The meat-packing plants are situated near the mouth of the river in order to be close to deep water during the dry season.

The plains south and east of the Orinoco rise to the Guiana highland and are covered with a tropical forest. Roads run up to and across the plateau, where men are busy gathering balata gum, iron ore, and rubber. The balata is used in making belting for machinery. The divi-divi tree grows wild through the country east

of the llanos. It is seldom more than thirty feet in height, but thrives in the hot lowlands where there is not too much rain. The trees produce as much as 200 lbs. of brown pods whose seeds contain up to 50% of tannin. Many thousand pounds are gathered each year.

The Andes.—Several ranges of moderate height run eastwards through northern Venezuela, separating the Orinoco valley from the Caribbean Sea. Between the ranges are lateral valleys in which the majority of the people live. On the windward slopes of the mountains the rainfall is heavy and the coastal plain is swampy. The rainfall in the interior valleys above 2,000 feet elevation is more moderate, and a temperate climate is found up to 7,000 feet. Beyond this, frosts occur and the higher peaks are snowclad.

La Guaira is the chief seaport. The small population shows that it is not a desirable place in which to live. It is only eight miles in a straight line to Caracas, the capital, but twenty-one miles by rail. At Caracas people have their homes amidst beautiful and healthful surroundings.

The mountain valley west of Caracas and on to Valencia, 170 miles by rail, is the best part of Venezuela. Coffee plantations are seen in favoured locations up to 6,000 feet and coffee is the chief agricultural export. Cacao plantations are located in the Valencia district and around Lake Maracaibo. Other products are tobacco, cotton, vanilla beans, and coco-nuts along the sandy coast. Corn is grown everywhere and is the staple bread grain of the people.

The tonka bean, the fruit of the serrapia tree, is gathered and exported. It is described as 'a black almond with delicious perfume', and the beans are used in the making of perfume. Chicle, the sap of a native tree, is exported to the United States, where it is used by the makers of chewing-gum. Some mahogany is also sold. From the native cotton plants a coarse kind of cotton fabric is made, and there are cotton mills at Valencia, Caracas, and Cumana. The finer textiles are imported from Manchester.

Lake Maracaibo is a shallow body of water, 150 miles in length but seldom more than thirty feet deep. The soil of the sloping lands around the lake is fertile, and cacao, tobacco, and sugar-cane are grown. Maracaibo is the export centre for this large area.

Mining.—Copper ores are mined in the mountains, and salt-mines are located at Cumana and Maracaibo. Coal of good quality is mined from the hills along the west side of the gulf. This is one of the few coal sources in South America. Petroleum

is secured from wells on the east side of Lake Maracaibo and but ten miles from the shore, where there are storage tanks and a large refinery. Petroleum is also produced from wells near the Gulf of Paria. Venezuela's oil production is rapidly increasing, the total for 1947 being 438 million barrels, about four times the 1940 production. There are now ten refineries and others under construction; these make it possible for Venezuela to refine one-half of its crude oil production. About 92% of the total value of exports comes from the sale of petroleum, and since the Government receives half the profits from all oil produced, this industry is playing a most important part in the development of the economic and social life of the country. On the mainland, opposite the island of Trinidad, asphalt is taken from the Bermudez pitch lake, which is 1,100 acres in extent and the largest known deposit in the world. Asphalt and petroleum have made Venezuela an important country in world commerce.

A large deposit of high grade iron ore has been found recently, not far from Ciudad Bolivar. Steel companies from the United States are preparing to mine the ore. To make the removal of this ore possible, the channel of the Orinoco is being deepened. A great deal of the profits from the export of iron ore will, as in the case of oil, go to the Venezuelan Government.

Colombia

Colombia stands fifth in size among the countries of South America, having an area of 450,000 square miles, and third in population, having a total population of 1,000,000. This neighbour of Venezuela contains some of the most beautiful scenery to be found in any of the Andean states. It has an unusual variety and wealth of natural resources, being an important world producer of platinum and emeralds. Gold, silver, lead, and mercury are also produced.

The principal rivers of Colombia drain northwards between ranges of the Andes. The Magdalena, 1,100 miles in length, is the most important. The Pacific coastal plain is narrow and has a regular coastline. The eastern slope to the llanos is gentle, and long rivers wind their way across the plain to the Orinoco. The climate is tropical. There is a heavy rainfall on the windward slopes of the mountains, while the western slopes are dry, with many grass-covered mesas. The lowland plain of the Magdalena River is hot and humid, and is covered with a dense tropical vegetation. The valleys of the tributary streams, however, present every variety of climate, from that of the humid lowlands

to the cold and frost of the high passes above 14,000 feet. Altitude rather than latitude is the factor that decides what may be grown. From 1,500 feet to 7,000 feet, the climate is subtropical, while the seasons are temperate from 7,000 to 10,000 feet. As in Venezuela, the majority of the people live above the 1,500-foot contour line.

The Magdalena basin.—Approaching the Colombian shore by way of the Caribbean, we find two centres of activity. The port of Santa Marta collects and exports bananas from the plantations of the United Fruit Company, which has similar plantations throughout the coast of Central America and the islands of the West Indies. Over a hundred miles of railway have been built to serve their large holdings in the Colombian area. Barranquilla is the largest city of the hot lowland plain. Although 14 miles up the Magdalena, a deepened channel makes it possible for large vessels to reach its wharves. The port has modern docks and loading facilities. Cartagena is another port of entry to the river.

From Barranquilla light-draught river steamers ascend the Magdalena 600 miles to La Dorada. In this section the river is often a mile wide and thirty feet deep, but during the dry season there is a month when it is unsafe for vessels of any considerable size. Above La Dorada a railway seventy miles in length carries passengers and freight around the Honda rapids, whence steamers complete the journey of sixty miles to Girardot, a commercial centre for the upper valley. Girardot is only 1,000 feet above sea-level although over 700 miles from the Caribbean. The heat in the valley at this point is most oppressive. From Girardot the Colombia National Railway completes the journey to the capital, Bogotá. The first eighty-two miles is a stiff climb over the central Andes, reaching a height of 8,000 feet.

As in other mountainous countries of South America, air travel is playing an increasingly important part in rapid freight and passenger transportation. Daily flights link the plateau and coastal cities which in turn are connected with world centres. This has eliminated one of the major obstacles to the investment of capital by foreign interests, who now find they can keep in close touch with their representatives in these hitherto remote places.

Agriculture.—Coffee is the leading product of the Magdalena valley and is the most important of Colombia's exports. It is grown on the sloping land back from the river and at elevations of 2,000 feet to 6,000 feet. In quality, it is considered as second only to

that of Arabia, and Colombia ranks next to Brazil as a coffee producer.

Cacao, which is such a valuable export from Venezuela, is produced on a very small scale in Colombia. The soil and the climate are eminently suitable, but the interest of the people seems to be almost wholly in the growing of coffee. Small shipments of cacao are imported from Ecuador.

Cotton of very good quality grows wild in the lower valleys. Some excellent cotton from Egyptian seed is cultivated along the Caribbean coast, and mills produce cotton fabrics. The growing of cotton will probably be extended.

The *Agave americana,* or century plant, which is cultivated as a hedge, affords fibre for twine, rope, sacks, and the *alpargatas,*



Courtesy Keystone View Co.

Market day in Sopetran, a mountain village of northern Colombia.

or sandals, worn by the poorer people. As in Venezuela, corn grows everywhere, from the hot lowlands, where three crops a year may be gathered, to the cool uplands at 8,000 feet elevation. It is the staple food of the inhabitants. Tagua nuts are gathered from the forests of the Pacific slope and in the valleys of the Atrato and the Magdalena. These nuts are called vegetable ivory, and are the chief source from which buttons are made. Colombia exports over 100,000 tons of these nuts each year.

Cattle-ranching is a widespread industry, especially in those sections which have a moderate rainfall in the lee of the mountain ranges. A large packing plant has been erected on Morosquillo

Bay, sixty miles south of Cartagena. It is estimated that Colombia has 10,000,000 head of cattle, and that with improved transportation the export of frozen meat will approach that of Argentina. As there are few railways, but many trails, leading back to the coffee plantations, horses, mules, and donkeys are bred in large numbers. Every one rides in Colombia, and a large part of the coffee is carried at some stage of its export on the backs of mules and donkeys. Goats thrive in the higher altitudes, where they are tended by the peasants. There is a large export of hides and skins.

Mining.—Coal of excellent quality is found near Cali in beds twenty feet thick. Anthracite extends for a distance of fifty miles along the Gulf of Uraba, and a seam has been located at the eastern end of the Santa Marta Mountains. There are coal-fields both north and south of Bogotá. The oil-field of Lake Maracaibo extends into Colombia. Wells have been put down along the Magdalena River, and the oil is piped 360 miles to Cartagena on the coast, where it is stored and refined. Recent production is estimated to be five per cent of that of Venezuela. Platinum and gold are dredged from gravels of the Atrato and its tributary streams. Emeralds are mined northwest of Bogatá. The workers live in Government buildings and are under constant police guard to prevent thieving. Nearly all the emeralds mined today come from Colombia. The product is under strict Government monopoly and the output is distributed through a firm in Paris.

Bogotá (350,000) is the capital, the commercial centre, and the focal point of learning and society for the people of Colombia. Throughout South America the size of the capital or governing centre in relation to the population of the state and to that of other cities is always a remarkable feature. Bogotá is at an elevation of 8,600 feet and is situated on a high shelf along the western slope of the eastern Cordillera. The elevation gives a mild climate. The Andes are a barrier to the wet Trade winds and the rainfall is moderate. The delightful climate is at least one reason for the city's location and for its size. The streets are paved with asphalt, and electric trams provide a modern means of transportation. There are open squares and plazas, shaded by rows of trees and bordered with strips of lawn and flowers. The Parliament buildings cover two and a half acres; other public buildings include a library, a museum, a great cathedral and many smaller churches, a hippodrome, and a bull-ring. Medellin is the most important manufacturing centre. It is situated in a mountain basin not far from coal mines.



Courtesy Keystone View Co.

BOGATÁ, COLOMBIA.

Ecuador

Ecuador is well named, since it lies athwart the Equator, extending from 2° N. to 6° S. It is one of the smaller South American republics and is largely Andean in contour. Very little is known of the wedge-shaped area which slopes eastwards to the Amazon. The district is inhabited by fierce tribes of Indians who resent the intrusion of the white man.

The coastal plain of Ecuador is wider than that of Colombia and receives heavy equatorial rains. The Gulf of Guayaquil extends a hundred miles inland to the estuary of the Guayas River. There is no similar indentation along the coast of the continent for a distance of 3,000 miles. This gulf, with the river which drains into it from the high Andes, provides Ecuador with a front door on the Pacific.

Guayaquil (180,000) is the chief city and commercial centre of the plain. It is located thirty-tree miles up the tidal Guayas River, which is a mile wide at this point. Steamers drawing thirty-six feet may reach the port which has a mile and a half of quays. The city has been modernized and the streets paved. The heat (average temperature 80° F.) and the humidity make the plain a difficult place for the white man to live in. The native Indian manages to exist, but is content with very little. There are large

tracts of land which, if cleared, would be suitable for the growing of rice, sugar-cane, cotton, tobacco, and bananas, but they are still covered with a tropical forest growth.

The cultivation of cacao is the important industry, and accounts for most of the exports. The cacao tree grows wild in Ecuador, and in many places it is sufficient to cut away the rank undergrowth, leaving the tall trees of other species to provide shade for the cacao tree. It is a form of agriculture which may be carried on by the Indian, the mestizo of small means, or the rich planter owning many acres and thousands of trees. The dried beans are tied in a home-made sack and carried on mule-back for miles through woodland trails to market. The growing of cacao on the coastal plain of Ecuador engages the energy of the people as does the growing of coffee in the valleys of Colombia.

In 1900, Ecuador dominated the world supply of cacao; but primitive production methods and crop diseases brought about a decline in production while world consumption increased. For these reasons, Ecuador's production is now less than 10 percent of the world supply.

One other industry of note is carried on to the north of Guayaquil in the Monte Cristo and Jipijapa districts. More Panama hats are made within a ninety-mile radius of Guayaquil than are made in Panama itself. The toquilla palm grows to perfection in the climate of this warm coastal plain. The patient natives pick the leaves while young and tender, and weave the straw under damp conditions. The tale of weaving these hats under water is another myth.

Ecuador is also the chief source of balsa wood, which is used in aircraft and marine construction, because of its extreme lightness.

The Andean section.—The Andes of Ecuador differ from those of Colombia. From the mountain knot of Azuay, near the Peruvian border, two high parallel ranges run north to a similar knot of peaks near the Colombian border, a distance of 300 miles. The great intermontane valley, some thirty miles wide, is divided into three basins by low transverse ridges, forming the Quito basin, the Ambato basin, and the Cuenca basin. Standing within one of these high but shallow plains, the traveller will see the lofty Andes on either side, notched with guardian sentinel peaks rising 17,000 feet and more above sea-level. Cotopaxi towers above the eastern range, while Chimborazo (20,498 feet) is the highest mountain in this part of the Cordillera.

A railway runs from Guayaquil to Quito (9,348 feet). It was opened for traffic in 1908 but was so expensive to construct that it has not made a profit on the investment. There are gradients of 5½%, switchbacks and loops, and rock-cuts across the face of sheer precipices. In the deep valleys terraced farms are seen, and one marvels at the industry of the native Indians who have occupied these slopes since the days of the Incas. Higher up are the products of the temperate zone, wheat, corn, potatoes, fruits and vegetables, and herds of cattle.

Quito (216,000), the capital, is the large city of the Plateau. It is within a quarter of a degree of the Equator and is one of the highest capital cities in the world. The size of the city is remarkable when one remembers its isolated position in the northern basin of Ecuador and the one line of railway connecting it with the coast.

THE CENTRAL ANDES

Peru

South of Ecuador the Andes divide again into two main ranges. These enclose a plateau much wider than in Colombia or Ecuador. This simple formation extends to the Chilean border, where the ranges again unite and proceed as a single range to Tierra del Fuego. The configuration of the central Andes would indicate that there is no valid reason for the existence of two countries within this region. In fact, a federation of Peru and Bolivia would seem to promise material advantage to both.

Peru has an area og 532,000 square miles and a population of 8,500,000. The costal plain is narrow and varies in width from ten to fifty miles. In a few places it is a hundred miles wide. Spurs of the coast range occasionally extend to the ocean, ending in bold bluffs. The change in climate is remarkable. South of Guayaquil the coast retreats to the south-east and is subject to the influence of the cold Peruvian current which flows north from the Antarctic. The cold water cools the air above it and the winds which blow from the sea to the land become warmed, since the land is under an almost vertical sun. The result is no rain. For 900 miles the coast is a desert. The dry conditions at this point are still further accentuated by the towering height of the Andes. The south-east Trades are drained of their moisture by the Andean barrier and descend to the coastal plain as drying winds. The Desert of Atacama is one of the driest places in the world.

Some fifty streams find their way down from the snow-capped peaks of the Andes and enter the plain, but only a few are strong



The Central Andes.

enough to reach the sea. Wherever there is water there is vegetation; the soil of the plain is wonderfully fertile, owing to the fact that the nitrates and phosphates have not been dissolved by seasonal rains. Irrigation is necessary in order to grow crops. It is possible because of the numerous streams, and profitable because of the rich soil.

Agriculture.—Corn, native to Peru, forms the staple food for the great part of the population, and is grown throughout the country. Cotton is the leading agricultural export, over 100,000 people being employed in its production. It is grown extensively in the irrigated districts of the coastal plain. The tanguis variety of cotton produces a long white fibre and yields 25% more than any other. Two or three crops may be taken from one planting; 80% of the crop is exported. A number of factories are engaged in making cotton, textiles, and cotton seed oil and in cleaning the seed for planting.

Sugar is the second in importance as a cash crop. The Chicama

valley, which extends from Trujillo to the mountains, a matter of forty miles, is the best area for the growing of sugar-cane. Because of the equable climate, the Chicama cane matures in eighteen months after planting and may be cut the year around. The sugar content is 15%, which is unusually high, and sixty tons of cane to the acre is an average yield. Since the sugar mills may be run for at least ten months in the year, instead of four or five months as is the case elsewhere, less machinery and fewer labourers are required.

Rice is also grown on the lower parts of the plain in sufficient quantities to supply local needs.

Fruits of various kinds are grown in all the coastal valleys. The section south of Lima produces grapes of excellent quality, and wine is made. Vineyards generally form a part of the larger interests of each *hacienda*. Olives are grown from trees of Spanish stock and are said to excel those of the mother country. Some olive oil is extracted. Olive culture will probably expand as more land is brought under cultivation. The hot, dry climate of the Peruvian plain is similar to that of southern California and the fruits are similar. Oranges, melons, alligator pears, and bananas are grown for local use. Peru, however, is too far away from the large industrial centres of the northern hemisphere to compete with Caribbean countries in the export of perishable commodities.

Fishing is carried on from small ports which are scattered along the coast. The catch of lobster, scallops, cod, sole, smelt, and mackerel remind one of the Nova Scotia fisheries on the Atlantic. The sea and the fertile irrigated lands provide a cheap living for the coastal inhabitants and this is an important factor in the profits made by the large sugar estates and cotton plantations. The wages of the Indian and the mestizo labourers are low because the means of livelihood are abundant and cheap and the standard of living is far below that in North America. The opening of the Panama Canal has made a tremendous difference in the commercial development of Peru, and the exports have more than doubled since 1915.

Petroleum.—The oil-fields of Peru also resemble those of California. The oldest are near the sea and there is a strong flow of oil. The chief district lies south of the Gulf of Guayaquil. The average depth of the wells, 2,000 feet, is an advantage when one considers the 6,000 feet of drilling necessary in the Turner Valley of Alberta. Peruvian oil is brought to Ioco on Burrard Inlet, British Columbia. Petroleum is now the leading Peruvian export in point of value.

Callao and Lima.—The trade of the Peruvian coast is carried on through Callao, the leading import centre and port of call for ocean steamships. The harbour is one of the best on the Pacific coast of the continent and is constantly being improved. Eight miles inland, in the fertile Rimac valley, we find Lima, the capital and the largest coastal city south of Los Angeles. Lima was founded by Pizarro in 1534 amidst the woe and destruction which he and his followers brought down on the devoted heads of the Incas. The beautiful City of the Kings survives today as the fairest gem on the shores of the southern Pacific. It has a population of 630,000.

The climate is mild and healthful. During the summer season, December to March, the temperature rises to 80°F; while in the winter, June to September, it rarely falls below 55°F. In the district thirty to forty miles inland, the heat is intense. The Peruvian current moderates the temperature of Lima. During the winter season, however, it causes damp, cloudy weather, and some days are foggy, as in San Francisco.

The interior plateau is almost as difficult of access as is that of Ecuador. The central railway was completed from Callao to Oroya in 1893 and was later extended to Cerro de Pasco and south to Huancayo. The following quotation from a Government publication gives some idea of the route through the mountains.

'There are 65 tunnels, 67 bridges, and 15 zig-zags where the steepness of the mountain side permits of no other means of ascent. In the first 74 miles the road climbs 11,500 feet; in the next 24 miles it rises to Galera station at 15,680 feet, where the divide is crossed and the road descends to Oroya, altitude 12,225 feet.' Oroya is only 139 miles from Callao. People with weak hearts are advised not to make the journey, and even strong men are affected by *soroche* or mountain sickness, *i.e.* headache and nausea, as a result of the lack of oxygen in the air at such great altitude. The costly railroad was built chiefly to transport the mineral wealth from the copper and vanadium mines near Cerro de Pasco. This town, built at an elevation of over 14,000 feet, is the highest town in the world.

The plateau is a rolling country with high rounded hills, cut here and there by deep river valleys 3,000 feet or more below the level, so that railway construction was a difficult matter even when the plateau had been gained. This is the home of the Quichua Indians who form the larger part of the population. Products of the temperate zone are grown and one may see fields of wheat, corn, oats, and potatoes. The potato grows wild in Peru and

scientists believe that it was first cultivated by the original Indian inhabitants of this tableland, and that its use spread into North America long before the coming of the white man. Growing in the Andean highlands are strains of Indian corn or maize which differ so much from those of North America that there is some reason to think that maize was also developed in these highlands.

The sparse grass of the higher mountain slopes is suitable for sheep. Here are herds of alpacas, and of llamas, the beasts of burden used by the Incas in their transport system. Goats, horses, mules, and donkeys are seen everywhere, grazing in small bands; the donkeys are often half-buried beneath a pack as they plod along the stony trails. Hides and wool are exported to the coast. Much of the wool is used locally by the Indian women, who weave blankets and ponchos. The nights are cold in these high altitudes, and woollen clothing is worn in the plateau country, while cotton is used by the people of the coastal plain.

Mining.—The interior plateau is better known through its valuable deposits of gold, silver, copper, lead, zinc and vanadium. Cerro de Pasco, ninety miles north of Oroya, has been a great mining district since 1830, when the Spaniards opened the silver mines. When the mines were first opened, the silver content was very high. As the miners went deeper, the silver content grew less and the copper content increased. Eventually the Spaniards closed down the workings. New methods, however, have made it profitable to mine the ores for the copper content. Any silver of course, is saved. One silver mine near Trujillo has ore running 600 ounces of silver and five ounces of gold to the ton. Vanadium is mined west of Cerro de Pasco. The ore is roasted and exported to the United States for refining. One mine produces about 1,000 tons annually and is the world's largest producer. Vanadium is used for making alloy steels for automobiles.

Coal is also found south of Oroya, and it is declared that the anthracite beds are the equal of those in Pennsylvania. Peru contains the largest coal deposits in South America. The use of oil and the difficulties of transportation have hindered the development of the coal, but the deposits remain a potential source of wealth.

Southern Peru.—A railway runs from Mollendo, via Arequipa, to Cuzco, with a branch to the western shore of Lake Titicaca, where steamers connect with the railway to La Paz in Bolivia.

From La Paz there is an all-rail route to Buenos Aires, thus providing a trans-continental service. The line from Mollendo passes through a fertile strip, intensively cultivated and well irrigated.

Cuzco, the ancient capital of the Inca Empire, has long been a centre of interest for archaeologists and searchers after treasure. The Temple of the Sun stands almost in the centre of the city, a short distance from the main plaza. Almost every street in Cuzco has the remains of Inca architecture—walls, arches, and doorways. Many streets are lined by walls of perfectly cut stone, now serving as a support for rude adobe structures. Cuzco is said to have had a population of 400,000 in those far-off days. It is now a mere shadow of its former greatness. The climate is mild and genial and the city is a favourite residential spot. There are a few flour mills and textile factories. Cacao and coffee are grown in the hot valleys 3,000 feet below the level of the plateau.

Puno is a trading centre of the Lake Titicaca district, and exports alpaca and vicuña wool. Potatoes, wheat, and barley are grown and cattle and sheep are grazed on the sloping lands of the Titicaca basin. The people who inhabit the roof of South America are largely of Indian blood and are in possession of the best land. These Indians have little to sell beyond wool and hides. Their margin of sustenance is very narrow. Many of them merely exist, patient plodders and men of many burdens.

Eastern Peru.—As yet, most of the river valleys of this section have mere trails connecting them with the large plateau cities. The trade routes lead down stream to the Amazon. Cacao, coffee, tobbacco, rice, cinchona, and coca are products which some day may be grown in large quantities. The government is encouraging settlement, and scientists are teaching new methods of farming.

Bolivia

Bolivia, with an area of 538,000 square miles and a population of 4,000,000, occupies the plateau south of Lake Titicaca. Like Peru, it extends east to the Amazon basin. On the south Bolivia extends to the low lands of the Paraná. The larger part of the population is found in the plateau region living at altitudes of from 6,000 to 12,000 feet. The lowland areas are undeveloped but the export of crude rubber is increasing in importance. The Bolivian plateau is wider than those we have discussed, and the mountain walls are a hundred miles apart. The native Indian has an even

lower standard of living than the native of Peru, a condition that is not to the credit of the white man's rule.

La Paz (300,000) is the largest city in Bolivia and is in every way the most important centre of trade. It is the highest large city in the world (altitude 12,005 feet). Even then it is situated at the bottom of a V-shaped valley, 1,000 feet below the general plateau level. The protected position gives La Paz a delightful climate and is one of the reasons for its large population. The whole district is a great range land where herds of goats, cattle, and horses, and flocks of llamas, alpacas, and sheep are grazed.

The mountains are rich in minerals and the mines give employment to many people. Tin, silver, copper, lead, zinc, antimony, bismuth, and gold are the chief minerals. Only the richest veins



Courtesy Keystone View Co.

A Flock of Llamas

The wealth of the poor Bolivian is likely to be measured in these animals. The llama provides both transportation and wool.

can be worked as the expense of delivery of ore to the coast is heavy. Tin is found through the eastern part of the plateau; the best mines lie east of La Paz. Bolivia supplies one-sixth of the world's tin output, and stands next to the Malay Peninsula in production of this metal.

Copper comes from the mines near the La Paz-Arica railway. These ores run 15% copper. There is no coal in Bolivia accessible for smelting, and the ores are shipped in their raw state or as concentrates to Europe, where they are refined. Lead, zinc, and silver are often found together in the same ore. Rich oil deposits are being worked near the Argentine border and south-east of Sucre.

Oruro is the second city of importance in the plateau. Tin, silver, and gold are mined. Alpaca and sheep's wool are exported. One-third of the tin mined in Bolivia comes from this district. Oruro is a railway centre and the terminus of the line to Antofagasta. Potosi is another mining centre with machine shops and small foundries and smelters. Sucre, the capital, is not in a good location for a governing centre. In consequence La Paz is the actual seat of government. A railway line from Sucre to Potosi was completed before the second World War and has since been continued to the Argentine border.

For a country lacking a seacoast, railroads are a necessity. The mountainous nature of Bolivia makes railroad building very costly. For an area greater than that of British Columbia there are only 1,500 miles of operating railway, a mileage regrettably inadequate to the needs of the country. This is one of the chief factors accounting for the lack of development in a country so rich in natural resources.

Chile

Chile is seventh in size among the countries of South America, but stands third in commercial importance, and this in spite of its curious shape. No other country in the world has been carved by the political boundary knife to form a ribbon 2,140 miles long and 85 miles wide with an area of 297,000 square miles. It has a population of 6,000,000.

The relief of the land influenced those who established this Andean state. There is a coastal ridge near the sea, which becomes more pronounced towards the south. The great valley of Chile may be compared with the great valley of California. East of the valley the land rises rapidly to the high Andes. The Chilean Andes offer no high interior plateau as in Peru, but march south to Cape Horn, a gigantic barrier range.

In this long ribbon of land facing the Pacific every extreme of climate is found. Northern Chile, in latitude 18 degrees, comprises the hot, rainless desert of Atacama. The dry area extends south almost to Coquimbo. From Coquimbo to Ancud, 800 miles, there is a temperate climate, similar to the San Francisco - Vancouver Island district in North America. South of Ancud the rain-swept forest lands stretch to the cold heights of Tierra del Fuego.

The desert of Atacama is famous for its nitrate beds. This deposit extends from Iquique to Taltal, a distance of 350 miles. It is the most valuable nitrate deposit in the world; its extent and

richness are due to the fact that this region has been rainless since the old sea-beds dried up, thousands of years ago. It has been remarked that 'If this desert land does not blossom as the rose, it produces the wherewithal to make other fields blossom, and the wealth to purchase the roses.'

The nitrate beds are from ten to eighty miles inland and at an altitude of 2,000 to 5,000 feet. They are covered by a few feet of earth and sand which makes mining a simple matter. The raw material, or *caliche*, may contain as much as 50% nitrate, but this is refined to 95% for export. Nitrate is used in the manufacture of gunpowder and of nitric acid, but the larger part is used as a fertilizer. Some of the constantly cropped and irrigated lands of Peru are using two hundred pounds of nitrate an acre in order to maintain fertility. North America and Europe buy large quantities of nitrate annually, but the Haber process, by which synthetic nitrates are manufactured, is now providing the greater part of world needs for fertilizers and explosives. About 70% of the world's supply of iodine is produced as a by-product of Chilean nitrates.

Iquique and Antofagasta are the chief centres of the nitrate trade. They have a combined population of 100,000 for whom every necessity of food, clothing, and shelter must be imported. The precious water is piped to Iquique from the Pica oasis, 60 miles away, and from San Pedro to Antofagasta, 193 miles. It is far too valuable to use in growing crops. In the desert south of Tacna, hardly a stream reaches the sea. Most of them lose themselves in the dry plateau at the base of the mountains. The 300,000 people who live in this region are there because of the nitrate deposits. It is a striking example of the reliance of a community upon one commercial product.

Copper is now the chief export. In fact Chile, producing about one-fifth of the world's supply per annum, stands second among the countries of the world. The great copper mine of Chile is at Chuquicamata, 190 miles from Antofagasta and six miles north of the railway line to Oruro. The mine is at an elevation of 8,000 feet, and is said to possess one of the most extensive copper deposits in the world.

Iron ore is exported—a very pure magnetite averaging 67% iron—to the United States for use in blast furnaces. Borax is secured from Lake Ascotan, 15,000 feet above sea-level. It is mined from the shallow parts of the lake where it is found in a layer thirty inches thick. The raw material is cut and left to dry

in the sun and wind. It is then roasted and refined to become the borax of commerce. Chile produces a large proportion of the world's supply. The lake is near the Bolivian border and the railway from Oruro to Antofagasta.

In 1948, an important railway was completed between Antofagasta and Salta, Argentina. This rail link has been named the trans-Andine of the north. At one point in the 543 miles it reaches an altitude of 14,282 feet.

Central Chile is served by the harbour of Valparaiso. The climate is temperate, the rainfall moderate, and there is a general air of business and hustle. The mercantile section of the city occupies a narrow flat near the shore, while all around the hillsides are dotted with residences like seats in an amphitheatre. 'Ascensors', run by cables, are used to carry freight and passengers up the steep inclines. Valparaiso is the largest seaport south of Callao and is the chief port of entry for Chile. Railways run north through the plain to Iquique and south to Puerto Montt, while the trans-Andine line crosses the Cordillera to Buenos Aires.

Santiago (1,100,000), is located on the Mapocho River at the head of the great valley and fifty miles south of the trans-Andine main line. Santiago is not only the seat of government, but is also the leading financial, social, and residential city of the republic.

The great valley stretches 750 miles south from Santiago. Mount Aconcagua (23,081 feet), the highest mountain in all



Courtesy Keystone View Co.

Rio Blanco Station, Trans-Andes Railway, Chile.

America, is its northern sentinel. The coast range on the west is broken by numerous low passes through which the Westerlies bring their moisture. Short branch railways run through the passes to the seacoast. Going south from Santiago the heat decreases, the rainfall increases, and dense forests cover the lower section from Concepcion to Puerto Montt. Cattle-ranching and sheep-farming are important in the drier sections. The growing of maize, grain, vegetables, and fruit is carried on where the rainfall is more pronounced. Grape culture is general, and excellent wine is made in the Santiago district. The miners and nitrate workers of northern Chile receive their food supply from the farms of the great valley of southern Chile, and the prosperity of the valley depends upon this market. Because of the nice adjustment of desert, minerals, and fertile valley, the *per capita* production of the Chilean people is higher than that of the other Andean countries, wealth is more evenly distributed, and Chile is a progressive country.

From what has been said one would expect to find manufacturing of considerable importance. Chile refines the larger part of the metal dug from her hills. This is in marked contrast with Bolivia. Chile has boot and shoe factories, textile and clothing factories, and coal is mined at Coronel and at Lota south of Concepcion. Electrical energy is developed on some of the streams. Wheat is ground into flour, and brewing of malt liquor is done from locally grown malt and hops. Raw sugar is imported from Peru and is refined. The building of small coasting vessels in another industry. An important steel plant near Concepcion began operating in 1950.

Magellan Territory covers 66,192 square miles, but the population is only 37,000. Large parts of this region are unexplored. Magellanes, on Magellan Strait, is the one large town in all this waste of water, rock, forest, and snow-capped peak. Coal is mined at Loreto, nearby, and ships replenish their bunkers at this port. Tierra del Fuego has several million acres of grass-land; sheep-raising is the major industry. Wool, frozen meat, canned meat, tallow, and sheepskins are exported. Oil is being produced near the Strait of Magellan.

THE EAST COAST OF SOUTH AMERICA

The eastern part of South America differs completely from the western or Andean section. Two great plains slope to the Atlantic, separated by the Brazilian highland.

The Paraná is the important river of South America. It may be compared with either the Mississippi or the St. Lawrence. For our purposes we shall include in the Paraná basin, the La Plata estuary, the Pilcomayo and Paraguay tributaries and the parallel stream, the Uruguay, giving a drainage basin of 1,198,000 square miles. Three countries, Argentina, Paraguay, and Uruguay, are in possession of these wide and fertile plains.

Argentina

The larger part of the Paraná basin is below the 500-foot contour line. The plains of the lower Paraná are known as the pampas. They extend for thousands of square miles as flat, gently sloping plains. The rainfall increases from south to north, and variations in the rainfall determines distribution of the crops. It determines grazing areas and those parts adapted for grain-growing and for mixed farming. In a similar way the heat increases over the northern Paraná and agriculture changes from that of the temperate zone to that of the hot, Mediterranean type.

Western Argentina lies in the lee of the high Andes, and a strip of dry, foothill country parallels the mountain chain. This narrow *mesa* land is stony and gashed with ravines, but provides enough grass for a scattered ranching industry based on sheep and cattle.

Northern Argentina is known as El Gran Chaco (The Great Hunting Ground). These plains have such a slight slope to south and east that much of the area is swampy and partly forested. In the rainy season large sections are flooded, leaving many brackish lakes and salt-pans during the dry season. The quebracho tree grows throughout the Chaco country. The logs, ground up for the extraction of the tannin which they contain, provide the world's largest supply of this commodity so important for the tanning of hides. The larger logs, two to three feet in diameter, are sawn into railway ties for use in low, swampy places. Quebracho is like cedar in its resistance to decay while in contact with damp earth, but it is so much harder than cedar that 'breakaxe' is its English name.

But wasteful methods and lack of conservation policies made serious inroads upon the available supplies of this valuable wood and other forest trees. Argentina's great need for fuel led to the conversion of all types of wood into charcoal, and the consequent loss of valuable by-products. Need for forest conservation became apparent and during the past five years the government has embarked on a policy of controls, industrialization, and reforestation

that will not only make Argentina independent of foreign producers for many forest products but also will perpetuate these industries.

Large areas have hitherto remained unexplored and undeveloped. The small population, restricted markets, poor transportation facilities, and the devastating effects of locust plagues have discouraged agricultural development. But the five-year plan of the present government is providing funds for irrigation and drainage, for locust control, and for scientific experiments and inquiry into the possibility of producing such commodities as cotton, silk, yerba-maté, tobacco, sugar, and vegetable rubber in quantities sufficient to supply Argentine needs.

Central Argentina.—South of the Paraná River more and more of the pampas are being devoted to growing grain. Argentina is now the leading wheat-producing country in the southern hemisphere. The wheat district extends from Santa Fé to Bahia Blanca and eastwards to the Atlantic. The rainfall, eighteen to twenty-four inches, comes at the right time of the year. The finest grain-growing area is the land between the Paraná and Uruguay, known as the 'mesopotamian zone', where the richness of the soil and the favourable climate combine to produce some of the finest wheat in the world. The flat lands, close to the sea, give Argentina a great natural advantage in wheat export, and make this country Canada's chief competitor. The growing of better quality grains, the use of modern productive methods, and the improvement of transportation, loading, and shipping facilities are placing Argentina in a position to meet any competition in international markets.

Near Buenos Aires, the rainfall increases and corn is the leading crop. Over three-quarters of the corn or maize which is sold in the world market comes from Argentina. The United States grows more corn but exports less. Flax is grown throughout the wheat and corn belt, mainly for the sake of the linseed, and Argentina sells 80% of the linseed which enters into international trade.

Oats, barley and rye are grown throughout this area. Sunflower seeds and peanuts, valuable for their high oil content, are increasing in importance as the government is stressing the processing of these products rather than their export in the raw state.

The pampas of Argentina cover more than two-thirds of the area of this republic. In their natural state they are one of the richest grassland regions in the world. The growing of grain on a large scale has developed within the last thirty years. With the exception of a few hills in the south-west, the pampas lie below the 500-foot level and appear to be perfectly flat with no percept-

ible slope. There are no river valleys or ravines to cross, and no severe frosts. The Government has laid a network of railway lines, which spread out like a fan from the great centre, Buenos Aires, and from Rosario and Bahia Blanca. The grain fields lie within a 300-mile haul to tide-water, or a navigable river.

Cattle.—A much larger acreage is devoted to the rearing of cattle than to the growing of grain. In some districts the two occupations overlap and many farmers are engaged in both pursuits. Cattle-raising, however, tends to be concentrated in the wetter eastern pampas, while the wheat predominates in the drier western part. Cattle are also important in Entre Rios province, across the river from Buenos Aires. They are used for beef and many fine herds of Short-horns and Herefords are to be seen. Prize animals are imported from England, and the general average of the herds is constantly improving.

The dairy industry of Argentina has made considerable advance during recent years. Meat, hides, and fats were the chief consideration of cattlemen in the past, and Argentina produced barely enough dairy products to meet her own requirements. Today, the future of dairy production is very bright and the number of establishments has doubled since 1935. Butter is exported in quantities sufficient to make Argentina one of the chief sources of supply for international trade. This advance in butter exports is accompanied by a considerable increase in the amount of cheese and casein exported.

Over large areas the natural grasses have been replaced by alfalfa. In fact, as many acres are devoted to alfalfa as to maize.

Sheep.—Sheep-raising is the third great industry of Argentina. Although wool is an important product it is interesting to note that millions of sheep are killed each year and that there is a large export of frozen mutton. However, the grazing of sheep on the pampas has declined during the last thirty years. This is due to the increasing amount of land given over to grain growing and the still larger amount used for alfalfa. Sheep do not thrive on alfalfa and have been pushed gradually to one side. In spite of these facts there are still more than 40,000,000 sheep in Argentina. Of late years sheep-rearing has spread to Patagonia, the plateau grassland south of the Colorado River, a region where grain will never thrive. Sheep raising is now the leading agricultural activity in Patagonia.

Manufacturing.—Because of the lack of coal and waterpower development, Argentina is handicapped in manufacturing. Coal is

mined in Patagonia but the cost of its transport to the sea is high. Much of the coal is imported from Great Britain whose vessels carry it as ballast at cheap rates, returning with cargoes of meat, grain, and wool. But under the stimulation of the second World War and of the present government, Argentina is processing more of her natural products than before. Large killing and freezing plants and meat canneries process or can many tons of beef and mutton. Creameries produce butter, cheese, and casein. Lumber, tannin, sash and doors, boxes, pulp and paper are produced from Argentina's timber resources. Grain products, flour, and cereals are also important products of the factories. Because of this trend towards industrialization, Argentina's agricultural economy has been changed in order to produce more of those plants that can be processed at home rather than having to rely upon imports. Wine, sugar, textiles, are all becoming increasingly important in the economic life of Argentina. But because of her lack of mineral wealth, Argentina must continue to buy machinery and many other such articles from countries that will buy her grains, meat, hides, and wool.

The Rio de la Plata is the St. Lawrence of Argentina, a tidal estuary, 250 miles long and 100 miles wide at the mouth. It represents the accumulated outflow of water from the drainage basins of the Paraná, Paraguay and Uruguay Rivers. The lower Paraná is navigable to Rosario for ocean steamers, and to the port of Paraná for steamers drawing twelve feet. Light river boats can ascend to the Matto Grosso of Brazil, 2,000 miles from Buenos Aires.

Mining.—Argentina is deficient in minerals and this lack handicaps the development of heavy manufacturing industries. With the exception of lead, bismuth, and silver, Argentina shows an alarming deficit for national needs, though zinc, copper, wolfram, and tin ore are mined.

An iron deposit at Zapla shows a reserve of 100,000,000 tons of rich iron ore. Argentina's education and technical skill have made possible the operation of a blast furnace, an achievement not equalled in many other South American countries. But this plant fills only 25% of Argentina's annual consumption of finished iron. The location of the coal deposits at the southern end of Argentina and the iron mines in the north make cheap iron production difficult.

Petroleum fields near the coast in Patagonia supply one-third of Argentina's requirements, while asphalt is mined and used extensively as a fuel, to compensate for the deficiency in coal.

Buenos Aires is the chief seaport of this great network of rivers and railways. The city is the capital of Argentina, the metropolis of South America, the largest city on the continent, and the third largest in either America. There are great public buildings, many magnificent private residences, broad avenues, and more than seventy beautiful parks and plazas. It is the chief commercial centre of the country and controls the trade which comes down the river from Bolivia and Paraguay.

Docks line the waterfront for a distance of ten miles. Elevators, with a total of 10,000,000 bushels storage capacity, and granaries holding 55,000 tons of sacked grain provide ample export facili-



Courtesy Keystone View Co.

DIAGONAL NORTE

A main street in Buenos Aires, Argentina.

ties. In some years as many as 60,000 ships, with an aggregate tonnage of 22,000,000, enter the harbour, bringing 85% of the imports and carrying away 50% of the exports of the country. The traffic at the waterfront has made it necessary to construct a new port at La Plata, thirty miles below the capital. Here are the principal meat-packing plants, an oil refinery, and large electrical works.

Bahia Blanca controls the trade of the Colorado River valley and the plateau region as far north as Mendoza. Rail connection with the pampas brings wheat, grain, and some cattle and sheep products for export. The harbour is an excellent one and the port

charges are low. Bahia Blanca exports as much grain as Buenos Aires and stands second to Rosario. A large amount of wool is also exported.

Rosario is 227 miles up the Paraná from Beunos Aires. It is situated on a bluff overlooking the river, which is twenty miles wide at this point. The city controls a large part of the trade of western Argentina and stands second to the capital in total import-export trade. It is the country's chief grain port and has large flour mills. Tanning of leather and sugar refining are also carried on.

Côrdoba is 432 miles distant from the capital and stands at an elevation of 1,440 feet. It is the largest of the interior cities. Established in 1573, it was for a long time the chief centre of culture for the lands below Peru and Bolivia. The climate is much cooler than that of Rosario, and many people have made it their home. Three hundred thousand acres are under irrigation below the city. Tucuman, to the north, is the centre of the sugar industry.

Mendoza near the foot of the Andes, is the centre of the wine industry and of a flourishing resort development.

Paraguay

Paraguay proper lies between the rivers Paraguay and Alto Paraná. A further area, the Chaco region, between the Paraguay and Pilcomayo Rivers is claimed by Paraguay, but this claim is disputed by Bolivia. A small war has been waged over this area, but in 1938, by treaty with Bolivia, Paraguay acquired some 91,000 square miles of the Chaco.

The climate of Paraguay is sub-tropical. Very little of the country is above the 2,000-foot level, while the larger part is below the 600-foot contour line. There is a wet season, and a dry season with great heat. As a result the plains of the Paraguay basin are open grassy lands with trees fringing the water-courses. Occasional floods on the Paraguay and Pilcomayo Rivers turn the low-lying lands into great shallow lakes or swamps. These *can* be drained and kept clear of excess water, but the time for this work awaits a decided increase in the population. Forests cover the hilly sections and extend to the Alto Paraná.

Quebracho trees grow in the Chaco of south-western Paraquay. The grinding of the wood and extraction of the tannin is the chief industry of this part. Ox teams haul the logs to light railways which in turn bring them to the mill situated on the river bank.

The refuse wood runs the mill and the extract is shipped down stream to Buenos Aires. One ton of quebracho wood produces 600 lbs. of extract.

Yerba maté is one of the well-known exports from the forested part of the country. Large plantations, some of them 30,000 acres in extent, have been set out. The production of the dried leaves amounts to nearly 20,000,000 lbs. a year. The leaves are ground to the required fineness in factories at Asuncion, Corrientes, and other places. The people put the powder into a gourd, pour in boiling water, and, after steeping it a few minutes, drink the liquid through a *bombilla* or tube. Millions of people in South America drink maté just as we drink tea.

Oranges and tangerines are grown and sent down stream in large quantities. More could be grown if there were a market. The leading commercial crop is tobacco which thrives in the district north and east of Ascuncion and ranks next to corn in acreage. Cotton is gaining ground, and since 1916, the acreage has increased over 300%. The farmers grow corn, sweet potatoes, beans, peanuts, and vegetables for local use. There are possibly 4,000,000 head of cattle in the country, and a small export of hides, jerked beef, and corned beef is made. Many more cattle could be kept, but competition with Argentina is severe and profits are small.

Ascuncion is the capital and chief river port. It is 950 miles from the sea. In 1945 the population of the city and the surrounding district numbered approximately 350,000, or over one-fourth of the total for the whole country.

Uruguay

Uruguay, although a little larger than Paraguay, has a population of twenty to the square mile as compared with five to a square mile for Paraguay. Uruguay is far more progressive than its inland neighbour. The climate is mild, with no extreme of cold, and has a short hot season. Rainfall is well distributed through the year and amounts to forty inches. The surface is rolling and does not exceed 2,000 feet in altitude, and wide river valleys give easy access into the interior. In addition Uruguay has 1,875 miles of railway, a larger mileage in relation to its area than any other country on the continent. The railways were built by British capital, but in 1948 they were sold to Uruguay, and are operated under State ownership as a separate administration called the Central Uruguayan Railway.

Stock raising is the premier industry of Uruguay. Durham, Hereford, and Polled Angus sires have been imported from England in order to improve the quality of the herds. Animals and animal products constitute 95% of the exports. Sheep number 22,000,000. As from Argentina, the shipments of frozen beef and mutton amount to many thousands of tons each year. A large amount of beef extract is exported from Fray Bentos.

Montevideo is the one large city of Uruguay. The wealth and refinement of the country gravitates to the capital city, the chief import and export centre, and a rival of Buenos Aires. Uruguay has one of the best school systems on the continent. Primary education is obligatory and there is very little illiteracy. The population of Uruguay is predominantly white, there being only a few Indians and mestizos.

Brazil

Brazil is the largest country of South America. Its size dwarfs all the other republics of the continent. We shall discuss Brazil under four headings: the Amazon basin, the Brazilian highland, Rio Grande do Sul, and the Matto Grosso plateau.

The Amazon basin.—It is fitting that the largest country should contain the largest river basin. The drainage basin of the Amazon and Tocantins Rivers covers an area of 2,700,000 square miles, or two-fifths of the continental land mass. No other river basin in the world has so large an area, and no other river brings so large a flood of water to the sea. It is 3,900 miles from the farthest source of the Amazon to the mouth; the main stream is navigable to Iquitos in Peru, a distance of 2,300 miles. Beyond Iquitos, vessels of light draught may ascend 486 miles to the foothills of the Andes.

The tributaries from the Brazilian highland are interrupted by falls fifty to a hundred miles from the parent stream. The Madeira is navigable for 665 miles during the rainy season, December to April. At that time the Madeira is as large as the Amazon at the point of confluence. It has been known to rise fifty feet in a few weeks and to flood thousands of acres of low land. It is the annual flooding of the land adjacent to the Amazon and its tributaries which has retarded settlement of the *selvas*.

The northern tributaries of the Amazon are smaller in size and number than those flowing in from the south. The Rio Negro is the largest, and is navigable for 450 miles. For a portion of this distance the Negro is a succession of lagoons, some of them twenty



Courtesy Government of Brazil

SAO PAULO, BRAZIL.

miles in width. The river is in flood when the sun's rays become vertical over the Tropic of Cancer, and the equatorial rain belt lies over the northern Andes highland and the Guiana highland, May to October. The Amazon begins to rise in November, reaches its maximum flow in June, and gradually recedes during the following months. At normal periods the river is from one to twenty miles wide, but during the flood season the *selvas* are submerged, in places, to a width of 400 miles.

The climate of the Amazon plain is hot and moist. The average temperature is over 80°F. and the rainfall is about the same number of inches. The rainy season is from November to March, with a period of less severity, August to October. On the upper Amazon there is a short dry season during January and February. In addition to the tropical rainfall over the *Selvas*, there is a heavy downpour on the eastern flanks of the Andes which bend in a great are across the path of the Trade winds. There is a dry area in the lee of the Guiana highland.

Rubber has long been an export from the Amazon. Seeds from the *Hevea* rubber tree of Brazil were taken to Kew Gardens in 1876 and successfully germinated. In 1881 some of these small trees were distributed in India and Ceylon. When these trees matured, the seeds were taken to the Malay States and the Dutch East Indies. There the *Hevea* flourished in a climate similar to

that of the Amazon, sometimes growing to a height of sixty feet within three years. Rubber plantations were set out, and by 1913 the output of plantation rubber equalled that secured from the wild trees of the Amazon, 50,000 tons annually. Ten years later the supply from the plantations amounted to 340,000 tons, but the supply of wild rubber had decreased to 24,000 tons. In Asia we now find 300,000,000 trees on 3,000,000 acres of land. Cheap labour is available, gathering of the latex is under supervision and the life of the trees is safeguarded.

The second World War created a great demand for crude rubber from the Amazon, as Asian supplies were in the hands of the enemy. Production from Brazil rose to 33,600 tons in 1943. Now the supplies of natural rubber are in price competition with the United States synthetic rubber manufacturers, which became well established during the war years. Rubber is by no means the only wealth of the Amazon Basin. There are dye woods and cabinet woods which can be used in the manufacture of medicines and insecticides. Cacao, Brazil nuts, babassu nuts, carnauba wax all await wider exploitation.

Belem (Parã), at one time a centre of the rubber trade, has now given place to Singapore. Manaos, 1,000 miles up the Amazon, is



Courtesy Keystone View Co.

Mozaic sidewalks in Belem, Parã, Brazil.

the centre for the Amazon rubber trade. One other interesting product of the Amazon is the castanha, or Brazil nut of commerce. The trees grow here and there in the forest, and the nuts are gathered after they have fallen to the ground.

The whole population of the Amazon basin is probably about 400,000, or one inhabitant to every five square miles. It is one of the world's greatest vacant spaces. The future of the valley lies in the control of the floods which inundate the low-lying plain. The culture of rice, cotton, or sugar-cane could then be undertaken. The Amazon is another possible source of food supply.

The Brazilian highland lies between the Amazon and Paraná Rivers. The larger part of this triangular mass forms a broad plateau, 1,000 to 3,000 feet above sea-level. It was once covered with a thick layer of sandstone which is now deeply eroded by the rivers. High, flat-topped ridges separate the streams, and indicate the old plateau level. Near the coast high mountain ranges run parallel to one another and leave a rather narrow coastal plain. These mountains, 7,000 to 9,000 feet high, intercept the south-east Trades, causing heavy rains on their eastern slopes and comparatively dry areas in the lee of the ranges.

The Atlantic coastal plain extends from the Amazon to Cape Sao Roque. The valleys of numerous short rivers provide areas of arable land. This section is subject to drought during the months of August to December. There are large areas of upland covered with grass and dotted with pines. Cattle and goats are grazed on these pastures. The flesh is dried, salted, and used locally; the hides are exported. Near the rivers, cotton and sugar-cane are grown. Wax is gathered from the leaves of the carnauba palm. It is similar to beeswax and is used as a base for shoe-blacking. Mixed with beeswax and tallow it makes candles of the best quality. The plain is well populated, the inhabitants numbering about four and a half millions.

Cape Sao Roque to Cape Frio.—As a result of difference in rainfall, this section of the coast is much more productive. Recife (Pernambuco), is the centre for the production of sugar. Cotton is grown on the higher lands. Sao Salvadore (Bahia) is the centre of the cacao industry. The city is situated on a bay twenty miles long and several miles wide, and is a port of call for transatlantic passenger lines and freight vessels. From the Bahia district come 119,578 tons of cacao yearly, an amount surpassed only by the Gold Coast area. The land is hilly near the coast, but inland there

are rolling, well-watered plains. The people are prosperous. Tobacco, coffee, vanilla, oranges, and pineapples are other crops. Manioc or cassava is grown throughout the coastal plain. The roots of the plant are pulped, washed, and dried, and then ground into flour. It is the food of the common people, and over 800,000 tons of manioc flour are produced annually. The cassava roots contain a form of starch, and this takes the place of the potato and wheat which we use so freely. Tapioca is made from manioc starch.

Cape Frio to Rio Grande do Sul.—The capital of Brazil, Rio de Janeiro, is the largest seaport of the Brazilian coast. Rio has the finest harbour in South America; some say, the finest in the world. It is easy of access, land-locked, deep, and commodious. A granite quay, which extends for two and a half miles along the waterfront, has the most modern machinery for the discharge and loading of vessels. Mountains rise steeply from the curving shore. It is a city of leisure, wealth, and magnificence on the one hand, and of industry, trade, and commerce on the other. Railways branch out to coast and interior points and bring to the city the products of the rich hinterland.



Courtesy Government of Brazil

Picking coffee beans, near Sao Paulo, Brazil.

The most renowned of the lands of Brazil, however, is the district of Sao Paulo, 300 miles distant from Rio. Here is the centre of the world's coffee production. The land is at an elevation of 2,000 feet, the rainfall is adequate, and the *terra roxa*, or red soil, is peculiarly adapted to the growing of the coffee plant. Brazil grows 75% of the world's coffee; two-thirds of this amount is grown in the Sao Paula district. Extensive hydro-electric developments have made manufacturing on a large scale possible and the city has grown rapidly.

Sao Paulo City is the financial and residential centre of the coffee district. As in Rio, splendid public buildings and private residences betoken the wealth and prosperity of the region. It is a cosmopolitan city, two-thirds of its population being of foreign birth, or the descendants of European stock.

Santos, the seaport, is fifty miles from Sao Paulo. The ascent to the plateau, 2,100 feet, is made within seven miles by means of five inclined planes, each one and a half miles long. The inclines have a grade of 8%. Stationary engines at the top of each incline control cables which pull up the railway cars, six at a time. Four tracks are in use in order to accommodate the tremendous traffic which comes from the plantations. The line is considered one of the world's engineering triumphs.

Rio Grande do Sul extends to the borders of Uruguay, which it resembles in contour and in products. Railways lead back from the ports of Rio Grande and Paranagua. The range lands of Brazil graze over 50,000,000 cattle, 25% of which are found in the Rio Grande do Sul. The cattle industry is not as well developed as in Argentina, and the export of frozen meats is not equal to that of Uruguay. Yerba maté is gathered in quantity and now Brazil produces 65% of the entire South American supply.

Porto Alegre is the largest city and an important port.

The Matto Grosso region is the name given to the plateau of western Brazil. The land is of moderate elevation, with grassy plains dotted with groups of palms. The river courses are fringed with forest growth. There is some cattle-ranching, but large areas are only partially explored.

Mining.—A small amount of gold is mined from the Brazilian highland. The province of Minas Geraes has most of Brazil's mineral wealth. Diamantina is the centre of the best diamond field, but the output is small compared with that of South Africa.

At Itabira, the government has developed what is believed to be one of the richest iron ore deposits in the world, and the Minas Geraes area has an estimated 12 billion tons of high grade ore, found near the surface. Manganese and beryllium are found not far from the iron. Manganese is used to give strength to steel, and beryllium to make it flexible. Here too is found in quantity the rare gem topaz and large deposits of rock crystal, used in making radios. No wonder that the population of this province is increasing rapidly. The production of minerals was greatly increased as a result of Brazil's participation in the second World War, and will probably become a growing and permanent part of the country's industrial economy.

In the centre of Minas Geraes is the modern planned city of Bello Horizonte, complete with wide tree-lined avenues, sky scrapers and a view that any city might envy. Already the population exceeds a quarter of a million. At Volta Redonda a city has been built with blast furnaces and rolling mills. Some of the coal used comes from Santa Catarina, further south, but much must be imported. The development of the steel industry will revolutionize manufacturing in Brazil.

Brazil is a country of varied resources. The people are strung along the coast; very little of the interior is developed. The Amazon and the Matto Grosso lands await the genius of man to turn them into fertile, productive areas.

THE GUIANA HIGHLAND

The Guiana highland lies between the Orinoco and Amazon Rivers. The coastal plain and highland is divided among the three colonies of British, Dutch, and French Guiana, which together occupy about 170,000 square miles of territory.

A low marshy coastal plain extends inland from ten to forty miles, rising gradually to a more elevated plain a hundred miles in width. This in turn gives way to the Parimé and Acarai mountains which rise to heights of 7,000 feet. The Essequibo River, 600 miles long, is the most important of the northward-flowing streams. The slope to the south is very steep. The rivers tumble down by a cataract and fall to the plains of the Amazon. Some of the falls have a drop of 700 feet.

The rainfall is heavier in the eastern part of the highland, occupied by the French and Dutch. In western Guiana the tropical forest gives way to grassy savannas near the Venezuelan border. The river valleys are everywhere heavily forested. The climate is hot, with little variation in temperature near the coast.

British Guiana

British Guiana has an area of 89,480 square miles, but the people number only 373,000. One-third of these are East Indians. They are employed on the sugar plantations of the coastal plain; in the rice fields, and in the coconut groves. Balata gum is gathered by the native Indians under white supervision. The trees are found along the river courses of the interior. Sugar, rice, rum, and coco-nuts comprise two-thirds of the exports. Alluvial gold, diamonds, and bauxite are mined from the mountains. The aluminum factories of Quebec derive part of their bauxite from the Guiana mines. The value of the diamond production is difficult to gauge but may be placed at 170,000 carats per annum with a value of $3,000,000.

Georgetown is the capital and largest city, near the mouth of the Demerara River. The rainfall, ninety-five inches, and the low-lying nature of the land have made it necessary to build the houses on posts. The roads are paved, the drainage ditches are kept clean, and Georgetown is free from the usual tropical diseases.

Dutch Guiana

Dutch Guiana is smaller in area, and in population. The chief products are the same: sugar, rum, rice, and molasses. Some coffee and cacao are also grown. The labour question is acute, and the development of the fertile coastal plain depends upon acquiring an industrious type of immigrant. Paramaribo, the capital, is the only city of importance and has nearly one-third of the population of the colony.

French Guiana

French Guiana shows even less development. It is nearly as large as the maritime provinces of Canada, but has only 30,906 people. Cayenne is the chief port and the capital. Devil's Island, a few miles distant, was, from 1885, the site of a penal settlement for habitual criminals sentenced to hard labour. The settlement discouraged immigration but has recently been disbanded. The interior of the country is covered with a dense forest, from which rosewood, greenheart, and balata gum are secured in small quantities. Gold placer-mining is carried on in the mountain streams. Many of the claims are worked by former convicts. Some of the escaped convicts found asylum in Dutch Guiana, where they are a serious problem.

Summary.—The need for conservation in South America is very great at the present time. This is reflected, in our life, in the high price we pay for coffee and chocolate, to mention but two examples.

The soil of the lands of the Caribbean, Central America and South America can be described as 'soils of moist, warm, and hot climates'. These soils create their own problems of land-use and the wanton exploitation, in past years, of some of these lands has contributed a great deal to soil erosion and loss of fertility.

The governments of these countries and colonies are individually, in co-operation with the Pan American Union, and, in some cases, with assistance from the United States, evolving land-use policies to protect the land and are teaching their farmers methods of controlling erosion and rapid run-off. The people of ancient civilizations in South and Central America knew how to use some of these methods, and their terraced slopes holding soil and water remain as great wonders of the ancient world.

EXERCISES

1. Compare the distances between London and Buenos Aires, London and New York; New York and Valparaiso, New York and Rio de Janeiro. State any influence these distances have upon trade between the various countries.

2. The Orinoco is almost as long as the St. Lawrence from the outlet of Lake Ontario to the sea, yet it is of little importance in the world trade. Why is this so? Give as many reasons as you can find.

3. What geographical conditions have retarded progress in Venezuela, Colombia, and Ecuador?

4. Brazil touches upon every country in South America except Ecuador and Chile, yet its trade with overseas countries greatly exceeds that with those countries touching its borders. Give as many reasons as you can to explain this.

5. We are inclined to think of the people of South America as being less 'modern' than ourselves, yet they are becoming more rapidly 'air-minded' than we are. Why is this so?

6. Why is it that much of the west coast of Peru is a desert while the west coast of southern Chile is heavily forested?

7. For each of the countries of South America pick out the one product for which that country is best known in world trade. In each case show what factors have contributed to specialization in this commodity.

8. Compare Chile and California as to (*a*) surface, (*b*) climate, (*c*) products, (*d*) transportation facilities.

9. Canada and Argentina have many similarities. What are they? In what ways do they differ? Which country has the greater possibilities for future development?

10. Compare climatic graphs for Manaos, Santiago, and Rio de Janeiro. Account for the differences of rainfall and temperature.

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PART FOUR: Eurasia

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19

EUROPE – GENERAL GEOGRAPHY

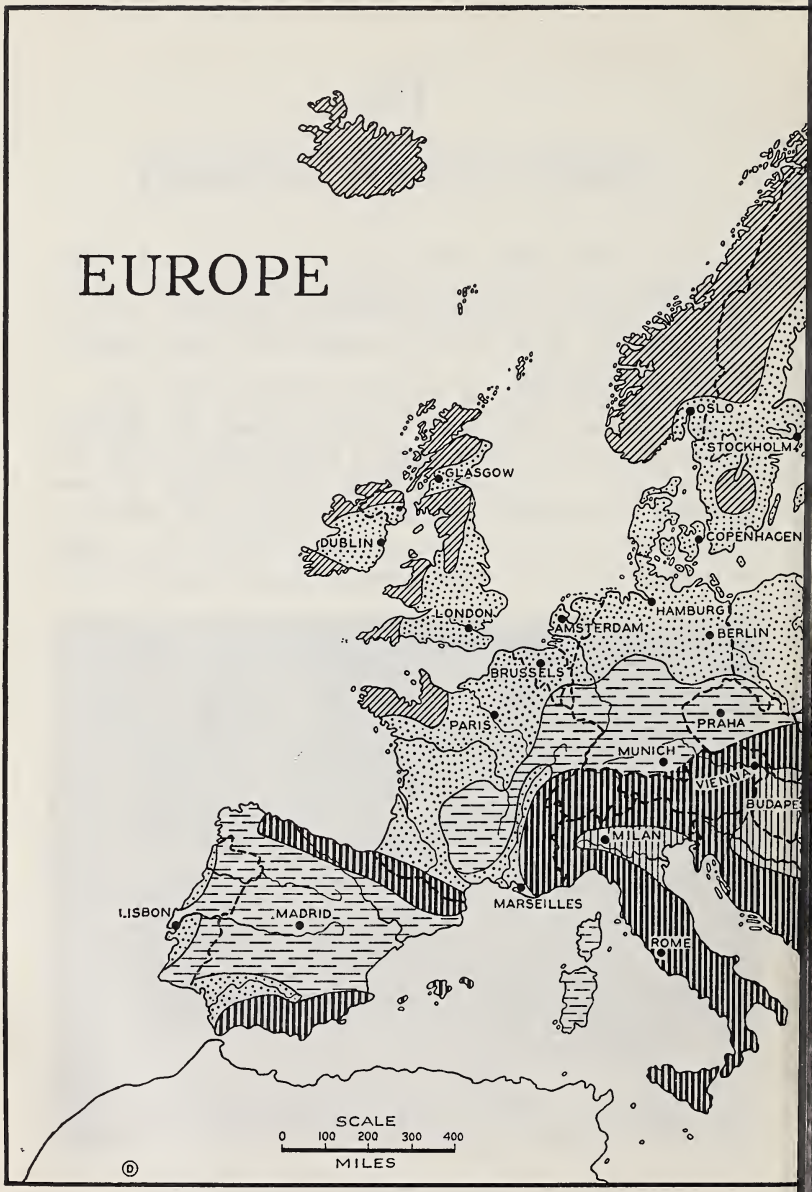
THAT part of the earth's surface which we call Europe is really the western part of Eurasia. From the standpoint of physical geography Eurasia is one great continent or land mass. The Ural Mountains and River however separate two areas distinctly different in many ways.

The shape and coastline of Europe, with seas and gulfs and navigable rivers making their way far inland, are singularly different from those of Asia, which is a solid block of land. The seas and gulfs all play their part in making Europe the most accessible of continents. A small part of Russia only is as far as 300 miles from salt water. Because much of Europe was so easily accessible to the outside world, ideas easily penetrated to the heart



Courtesy Richard Mathews

Old and new are blended in the cities and towns of Europe.


EUROPE
OSLO
STOCKHOLM
GLASGOW
DUBLIN
COPENHAGEN
LONDON
HAMBURG
AMSTERDAM
BERLIN
BRUSSELS
PARIS
PRAHA
MUNICH
VIENNA
BUDAPE
MILAN
LISBON
MADRID
MARSEILLES
ROME
SCALE
0 100 200 300 400
MILES
D


ARCHANGEL
LSINKI
LENINGRAD
MOSCOW
ARSAW
KIEV
KHARKOV
BUCHAREST
GRADE
SOFIA
ISTANBUL
TIFLIS
ATHENS
PHYSIOGRAPHIC REGIONS
Northwestern Uplands
Ural Mountains
Central Lowlands
Central Plateaus
Alpine System
" " Inclosed Plains

of the continent, hastening the development of European peoples. Traders and explorers from Europe in turn carried their ideas and culture to the far corners of the world. Europe has one mile of coastline for each 190 square miles of area; Asia has one mile of coast for each 337 square miles of area, and of this the Arctic coast of Asia, or one-fifth, can be used for commerce only with great difficulty, and for a few months of the year. This lack of suitable harbours, and the tremendous distances across the land mass, not only cut off Asia from trade with the outside world, but prevented the circulation of ideas between the peoples of Asia and the rest of the world.

Nowhere in the world have people succeeded better than in Europe in the careful management of the soil. Much that is being done in North America now as part of the 'Conservation Movement' was accomplished two hundred years ago in Europe. This great accomplishment is called by historians the 'Agrarian Revolution'. Good farming at home and access to raw materials abroad made many European countries, including Germany and Britain, great industrial producers. Conservation in Europe is more concerned with wise use of the non-renewable resources, especially coal, iron and petroleum.

Increased mechanization of agriculture will expose the soil of Europe to some of the abuses we have experienced on this continent. The problem is not likely to be so acute because rain falls more gently and many good practices are now in use. Europeans realize that much of their prosperity in the past came from exploitation of land in the New World. They are now taking their part in the world movement for conservation of resources.

Area is imposing, but it is the people, and what they do, that determines power and influence. It is in this particular that Europe and Asia differ so markedly. Europe is the home of the Caucasian peoples; Asia is the home of the Oriental peoples. Some of the peoples of Europe have lead in developing trade routes to other countries, in defending these routes, and in the use of machinery. In a general way we may say that four continents have either been brought under the control of the nations of Europe, or are governed by people descended from European stock.

Post-war conditions.—The devastating effects of the first World War were felt in Europe for twenty-five years, and they played no small part in causing a second World War even more disastrous than the first. Agricultural and industrial production during this

conflict fell to a fraction of what it had been in the decade preceding it, and it will take some time to reach pre-war levels.

In order to supply the post-war needs of those countries chiefly affected, vast quantities of foodstuffs, clothing, and machinery have had to be imported. These imports have been made possible largely by gifts and loans from the United States, Canada, and the Commonwealth countries. The United States goods were distributed under the Marshall Plan and have done much to relieve distress and to help in re-establishing the economy of the war stricken areas.

Such gifts however, cannot become a permanent part of European economy and the loans must be repaid. To do this the European countries must produce a surplus of goods acceptable to those countries supplying necessary commodities, and sell them at a price low enough to make them attractive to foreign buyers. Already difficulties involving marketing have been encountered, and European currencies in terms of United States and Canadian dollars have dropped considerably. In order to sell in these markets, European exporters also face competition they did not have to meet before, that of home produced goods which began to be manufactured when imports were not available; and now that these home industries have gained a start, it will be hard to meet their competition. Industrialization under the impetus of war increased to a surprising degree in many countries such as the United States and Canada, and in the more advanced of the South American republics.

The trade policies of Canada and the United States are not as favourable to the exchange of goods as they might be. Both countries still levy relatively high tariffs. It is interesting to note that the United States leaders advocate the removal of restrictions on trade between European countries as a measure to promote prosperity, though their own country still maintains its high tariff policy.

The present political unrest in European countries is also playing its part in keeping back production. Industry cannot produce efficiently unless there is some feeling of security among the organizers and the workers. The bitterness and violence that result from radical political and economic changes do not help to promote that necessary feeling of security, and will be a retarding factor in the re-establishment of the European economy. Until the threat of revolution or of war disappears, it is difficult to see how many of these European countries can regain their pre-war

standard of living and re-establish their commerce with other nations on a sound basis.

It is difficult to give an accurate account of Europe's present economic production. In many cases production figures are not available, and those that can be obtained are not always reliable. Until peace treaties have been arranged even political boundaries are not settled.

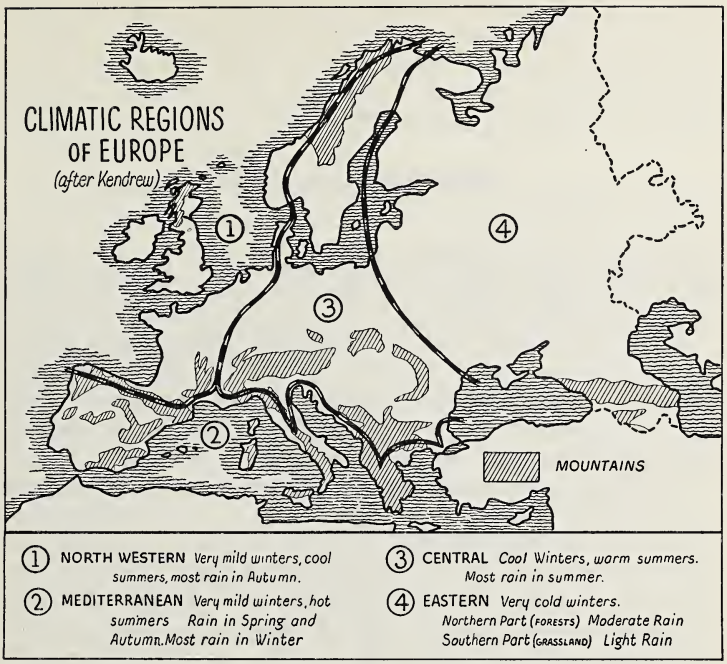
PHYSICAL FEATURES

The primary highland of Europe extends from west to east through the southern part of the continent. The two secondary highlands are far to the north and north-east. This arrangement is quite different from that found in the two Americas. In Norway and in Spain the mountains act as a barrier, but the 1,000 miles between these ranges is occupied by shallow seas and low-lying land. Nor does the primary highland present a continuous ridge from west to east. There are old water-gaps in the ranges, and 500 miles of plain separate the Carpathians from the Caucasus.

The steep slope of the primary highland is to the south, and the plain along the Mediterranean is narrow. The northern slope of the highland is quite gradual. The rivers soon become deep, slow-flowing streams as they wind their way across the plain. They are free from rapids; large cities are found along their banks and at their mouths. Canals connect one stream with another, and the people of the north European plain enjoy the benefits of cheap water transportation.

The great plain of Europe extends from the Atlantic to the Urals. From Bayonne to Warsaw it is from 100 to 300 miles wide. East of Warsaw it broadens into the Russian platform, which stretches from the Arctic to the Black Sea. Throughout the plain the surface is generally below the 500-foot contour line, only a part of central Russia approaching 1,000 feet in altitude. When we consider the small size of the continent we see that Europe has a large lowland area in comparison with that part occupied by the mountain masses. This helps to explain the dense population which the land of Europe is able to support.

The climate determines the types of agriculture which have been adopted in the several regions of the continent. It has an important bearing on density of population and on the strength of the nations which have developed within these regions. Most of Europe lies between the parallels of 40° and 70° north latitude.



The January isotherm of 32° shows mild temperatures over the northern plain as far east as the Elbe River. Farther east the winter temperatures become more severe and the summer temperatures correspondingly higher. This is due to distance from the sea.

The rainfall of Europe, north of the primary highland, is well distributed throughout the year. Much of western Europe has a rainfall similar in amount and distribution to that of the St. Lawrence valley. Mediterranean Europe will be discussed at a later stage.

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20

THE BRITISH ISLES

THE islands of Great Britain and Ireland are the two main members of the group which we call the British Isles. The importance of this group of islands is quite out of proportion to the total area, 120,000 square miles, and the population is greater than that of any other island group of equal size. The expansion of Britain overseas has been one of the wonders of the modern world. The people of these islands have gradually broadened their influence until now it encircles the earth.

The British Isles are the governing centre of the British Empire, or British Commonwealth of Nations, as it is now known, an empire which has developed since the discovery of North and South America and the opening of the sea route around Africa. The discoveries of Columbus and Vasco da Gama placed Britain in a new position geographically. As long as the Mediterranean remained the centre of the known world, the British Isles were on the outside edge of things. Discovery of the Americas placed them in the centre of the land mass of the northern hemisphere. As a result, the sovereignty of trade passed from the Mediterranean to the countries bordering the Atlantic. Spain, Portugal, France, Holland, and Great Britain struggled for a share of the new trade. Of all these countries Britain became the most successful in trade and in colonization.

One reason for this is Britain's insularity. Living on an island, the people have been able to avoid many wars which were waged on the continent. The narrow seas have protected Britain from invasion and her people have developed a world outlook in trade and commerce. Such a policy maintained for several hundred years has led to the acquisition of many portions of the earth's surface and the formation of the British Commonwealth.

PHYSICAL STRUCTURE OF GREAT BRITAIN

The British Isles lie on what is called a 'continental shelf' and are separated from the Continent by very shallow seas. This

continental shelf was once a great plain which formerly joined Britain to the mainland and which was submerged during the great Ice Age. The shelf, or submarine platform, is, for the most part, less than 600 feet below the surface of the sea and these shallow waters provide the largest fishing grounds to be found anywhere in the world.

The Highlands of Scotland, running from north-east to south-west, are the oldest chain of mountains in Britain and are the remnants of a range which once extended from Scandinavia. These mountains have been glaciated and a large number of narrow, ribbon-like lakes remain as evidences of the last ice age. Some of the peaks reach an altitude of 4,000 ft. but the majority of the ridges are under 3,000 ft.

The Southern Uplands lie parallel to the Highlands and between the two lies the lowland plain of Scotland, stretching from the Firth of Clyde to the Firth of Forth. The Uplands merge gradually into the Cheviot Hills which mark the boundary between Scotland and England.

The Pennine Chain extends southwards through the narrow neck of England from near the Scottish border to the Peak District of Derbyshire. The Pennines are not a mountain chain but a dissected plateau divided into three sections by faults which run east and west. In the Northern Pennines, lying between the Tyne fault and the Stainmore Pass are found barren moors and only poor pasture which, however, is suitable for sheep rearing. The deep valleys of this region are notable dairy farming areas.

The Central Pennines extend southwards to the Aire Gap in Yorkshire and are composed chiefly of limestone ridges with many underground waterways and subterranean caverns.

The Southern Pennines, south of the Aire Gap, terminate in the Peak District of Derbyshire. Here are found large heather moors and peat bogs, and deep, well-wooded valleys.

The Pennine Chain lies closer to the western coast of the island than to the east and the longer rivers flow across the wide eastern plain to the North Sea. This is a distinct advantage in trading with the countries bordering the North and Baltic seas.

The Cumbrian Mountains extend over the two counties of Westmorland and Cumberland. This is the region known as the Lake District. The beautiful scenery, with deep valleys and numerous lakes, attracts a great number of tourists each year. Apart from

the tourist industry, the chief occupations of this region are pastoral farming and sheep rearing.

The English Plain has an average elevation of only a few hundred feet above sea-level but is crossed in several places by ridges running from east to west and from south-west to north-east. These ridges, or escarpments, are composed of limestone and of chalk in south-eastern England. The Cotswold Hills, the Cleveland Hills, and the North York Moors are limestone escarpments and the Chiltern Hills, East Anglian Heights and York Wolds are examples of chalk scarps.



Courtesy United Kingdom Information Office

DINES, SNOWDONIA, NORTH WALES

The Cambrian Mountains of Wales form a block of old, hard rocks similar in character to the Highlands of Scotland. The structure in central and northern Wales lies from north-east to south-west with deep valleys cutting through the high land. South Wales is composed of younger, folded rocks, with the structure lines running from west to east. In these younger rocks is found the valuable South Wales coal-field.

CLIMATE

The British Isles lie in the Temperate Zone and have an oceanic climate. The prevailing winds blow from the south-west. These come from the ocean and are heavy with moisture. They have to rise over the high, mountainous districts of the west coast where they lose most of their moisture and thus the eastern regions of Britain receive less rainfall than those in the west. In general, the

climate of the British Isles is humid and there are no great extremes in temperature.

Harbours and ports.—The map shows that the larger part of the island faces the coast of France on the one hand and the coast of Holland and the important Rhine mouth on the other. The Rhine is the great highway of northern Europe, and the Thames is the great river of southern England. These two valleys contain millions of people and their commercial value is rivalled only by the Hudson-Mohawk valley of North America.

All the river ports of Great Britain are free from ice during the winter months. The plain of northern Europe has only three ice-free river mouths: those of the Seine, the Rhine, and the Elbe. The number of good harbours round the shores of Britain has been a great help in the development of world trade. The fact that the islands stand on a shallow platform causes an increase in the rise and fall of the tides. The tide is still further increased by the V-shaped entrances to the larger rivers. The tide coming in moves up a gradually narrowing funnel; the water piles up until, at Portishead, near Bristol, high-water is forty-five feet above low-water mark. During the ebb, the tide rushes out, scouring the channel and keeping the entrance clear of the silt which the rivers bring down. It is for this reason that the London docks, twenty miles up the River Thames, may be reached by the largest steamers. The vessels and freight barges come in with the flood and go out with the ebb tide.

INDUSTRIES

When we find that the population of England and Wales in 1801 was only 8,892,563, and in 1948 was over 43,000,000, we ask: 'Why has the population increased so rapidly in that time?' The answer is found in your history text under the heading of 'The Industrial Revolution'. Between 1750 and 1800 men learned to smelt iron by using coke made from coal. The steam-engine was perfected and mills were built to house the machines run by steam-power. England soon led the world in the use of machinery and in the use of steam-power to run the machines. This gave a wonderful start in the race for trade supremacy. Britain's navy made the trade routes secure, and the overseas possessions provided closed markets for manufactured articles.

Wider markets meant more factory hands to supply the demand. The cities grew larger, the population increased rapidly. Raw products were imported to feed the machines as the local supply

proved inadequate. Britain's insular position made it very easy to carry on the import of raw material and the export of finished articles. In fact, so many of the people began to make their living by manufacturing that the farm hands were unable to supply all the necessary food. Today 80% of the people of England live in urban centres, only 20% being found on the farms or engaged in the fisheries.

Coal.—The British Isles are rich in coal and nowhere in Europe is coal found so close to tide water. The coal is of excellent quality and in generous beds. The coal-fields may be divided into the following main groups: The Scottish fields; the north-western fields of Northumberland and Durham; the Lancashire and Yorkshire coal-fields; and the South Wales fields. Nearly all the manufacturing areas of Great Britain are situated on or are near coal-fields and up to 1914 the export of coal to other countries was an important factor in British trade. The sale of coal helped to buy the raw materials for the factories and the coal ships returned to Britain carrying the bulky, raw products of other lands.

The fisheries.—Britain's fishing industry is composed of three main sections. The distant water fishery where trawling is carried on in all the waters round the British Isles, as far afield as the Faroes, Iceland, the Norwegian coast, and occasionally the west coast of Greenland and Newfoundland; the near and middle water fishery; and the inshore fisheries. The catches of trawlers consist of cod, haddock, plaice, turbot and soles, which live on or near the sea bed. Pilchards and mackerel live in the intermediate waters or near the surface and are caught mainly by drift nets or ring nets. The great herring catch is found by both trawlers and drift nets. Great Britain's trawler fleet numbered 1,128 vessels in 1949.

The principal white fish ports are Grimsby, Hull and Aberdeen on the east coast, and Fleetwood and Milford Haven on the west. Great Yarmouth and Lowestoft in England; and Lerwick, Fraserburgh, and Peterhead in Scotland are the great herring ports.

Grimsby, on the Humber, is noted for the extent and value of its fisheries. From here, the trawlers visit the northern waters of Iceland, the Faroes, and the North Sea. The neighbouring port of Hull produces the largest catch of fish in Great Britain, which consists mainly of cod and haddock, and concentrates on the distant water fisheries.

The third principal British fishing port is Aberdeen and its trawling industry is of great importance to Scotland.

Wales

Wales is a westerly sector of Great Britain, bordering on the English counties of Cheshire, Shropshire, Herefordshire and Monmouth. The boundary between England and Wales follows the edge of the highland and coincides roughtly with the division between the older, hard rocks of the west and the newer, softer rocks of the English midland.

The coastal plain of northern Wales is much narrower than that which borders the Bristol Channel. Snowdon (3,560 feet), the highest mountain in Wales, looks down on Menai Strait and Anglesey. A railway runs west from Chester, crosses the strait by means of a tubular iron bridge, and continues to Holyhead. Steamers connect with Dun Laoghaire (formerly Kingstown), and the port of Dublin, sixty miles distant from Holyhead.

Central Wales is mountainous with the steep slope facing the west. The rainfall is heavy. Where there is soil in the narrow valleys, root crops and oats are grown. The mountain-tops are rounded, slope gently to the east, and resemble a plateau more than a mountain range. The eastern slopes are drier than the windward side. It is hardly too much to say that the Welsh highland is a great sheep pasture. In all Wales there are 1,800,000 acres of rough grazing-land and 2,100,000 acres of permanent pasture out of a total area of 5,099,000 acres.

The rains and the mists of the mountain-tops, the green of the hill-sides and valleys, the moorland pastures, the tumbling waterfalls make Wales a picturesque and lovely part of the islands of Great Britain. Thousands of tourists visit the mountains and the seaside resorts each summer.

Industries.—The well-being of the people of Wales centres in the largest and most important coal-field within the borders of Britain. The coal-beds lie in a basin on the southern side of the Welsh mountains. Small streams have cut narrow valleys through the overburden and exposed the coal-seams. All the mines are within easy distance of the sea and the loaded cars have a downhill haul. Coal is delivered at the docks at a very low price. Large quantities of coal are exported from South Wales. Cardiff, situated at the mouth of the River Taff, is a noted coal-exporting centre, as is Newport at the western end of the coal-measures.

Not only is Welsh coal close to six good harbours, but Welsh coal sets a standard of excellence. It is the best steam coal in the world. It stands up well under boilers where great heat is required. Some of the coal is classed as anthracite. Welsh steam coal is

found at most of the British coaling stations on the principal world-trade routes.

Many years ago local iron ore and copper-tin ores from Cornwall were brought to the coal-field to be smelted and refined. But now, much of the iron ore is brought in from Spain and northern Africa. Dowlais and Merthyr Tydfil are iron-smelting towns. There are also iron works at Swansea and Cardiff. Tin ore, copper ore, and blister copper, zinc ore and lead ore are also imported from abroad, and both Swansea and Cardiff have large smelting and refining works for the treatment of these ores. Swansea is noted for its tin-plate mills. The larger part of Canada's Pacific salmon catch is put up in tin cans made from Welsh tin-plate.

Building-stone and slate are quarried in the Carnarvon district of north Wales.

Agriculture.—The plain of Gwent borders the highlands of southern Wales. The rearing of cattle and of sheep, together with market gardening, is carried on. One of the main railway lines from London runs through the plain to Fishguard, where ferry-boats cross the strait to Rosslare, in Ireland, fifty-five miles away. The large harbour of Milford Haven contains the naval dockyard of Pembroke, and as we have seen, is a fishing port.

England

THE SEVERN VALLEY

The Severn drains the eastern side of the Welsh highland and empties into Bristol Channel. Many old towns, some of them dating from Roman times, are found in this fair and fertile land. The upper Severn enters the plain at Shrewsbury. The Roman road, Watling Street, ran through Shrewsbury on its way to Chester. Shrewsbury is an important railway centre and controls a large part of the trade of north-east Wales. Dairying and mixed farming are carried on in the district.

The lower Severn is a fertile agricultural plain. Worcester is the central market town and is noted for its potteries and fine porcelain ware. Kidderminster manufactures carpets. The Warwickshire Avon drains the Vale of Evesham, which is noted for its orchards. Coventry makes bicycles and motor cars. Rugby, noted for its school, is a railway junction and has electrical engineering works. Stratford-on-Avon was the birthplace of Shakespeare. Gloucester is an old medieval fortress town at the first crossing of the Severn. It controlled the route westwards to the plain of Gwent

and northwards into the Hereford basin. It is now an agricultural depot and a forwarding point for raw materials *en route* to the Black Country. A canal has been built from Sharpness to Gloucester so that vessels may avoid the tidal bore which sweeps up the river. Barges are used above Gloucester.

Bristol, on the Bristol Avon, is the chief city of the lower Severn basin, and one of the chief ports of the British Isles. The head of the Avon valley meets that of the Thames, giving the shortest and easiest route from east to west across southern England. Canals connect the Avon and Thames. The city of Bristol constructed a deep harbour at Avonmouth and has a large trade with South America and the West Indies. This accounts for the sugar, cocoa, and tobacco manufacturing plants in and near the city.

THE CHESHIRE PLAIN

The county of Cheshire is bounded on the north by the Irish Sea and the Mersey. The Cheshire Plain has the finest pasture land in Britain and is divided into grazing and dairying districts. The chief product of the county is cheese and many cereal crops are grown. The capital of the county is the beautiful old town of Chester. The chief rivers, the Dee, Weaver, and Mersey are all navigable and, in addition, Cheshire has a splendid system of canals, including the greater part of the Manchester Ship Canal.

Industries of the Mersey Region.—The towns around the head of the Mersey estuary specialize in the manufacture of chemicals, glass and soap. One of the main reasons for the location of these industries here is the proximity of the great salt-fields of Cheshire. Salt and its products play an important part in the manufacture of these products. The salt is found in thick beds in the Weaver valley and was once obtained by mining. Now, wells are bored and water is forced down to the salt. The brine which comes to the surface is evaporated to dryness and the resulting salt crystals are purified.

The chief centres of the chemical industry are Widnes and Runcorn, and other important towns with this industry are Northwich, in Cheshire, and Fleetwood in Lancashire.

Widnes and Warrington are the chief centres of the soap industry and Port Sunlight, at the mouth of the Manchester Ship Canal, has one of the largest soap factories in the world.

Cotton and woollen goods and silk and lace are manufactured in the towns near the Lancashire and Yorkshire boundaries.

Cotton.—The import of cotton and its manufacture is the great industry of Lancashire. It was originally based upon the suitability of the climate as well as upon cheap fuel for the furnaces. The Pennine Mountains border the plain on the east, and the westerly winds deposit their moisture against the mountain flanks. The nearer a town is to the hills the damper the climate, and damp air is a help in spinning the fine cotton fibres. The cotton-spinning factories were built on the western side of the Pennines in order to take advantage of this factor. It is now possible to control the humidity in a modern factory and the climatic consideration is not so important. It is for this reason that we find cotton factories in Georgia, Bombay, and Japan—places which have several months of dry weather each year. However, the coal mines of Lancashire continue their supply of fuel, and the skilled workmen of this district produce more cotton goods per capita than any other people.

Specialization has taken place within the district. Oldham, Bolton, Bury, Stockport, and Stalybridge are noted for their spinning mills; Burnley, Blackburn, Darwen, Accrington, Nelson, and Preston are centres for the weaving and dyeing of cotton fabrics.

Manchester.—(703,175). Five rivers flowing through the city, the Irwell, Mersey, Medlock, Irk, and Tib, and the Manchester Ship Canal, make Manchester, though thirty-five miles from the sea, one of the most important seaports in the country.

The spinning and weaving of cotton are almost entirely carried on in the surrounding towns of Lancashire, and Manchester is primarily the distributing centre for cotton goods to all parts of the world. Engineering and chemicals are the largest industries after cotton and electrical equipment; clothing and indiarubber goods are produced in large quantities. Manchester also specializes in the making of the intricate spinning and weaving machines used by the cotton manufacturers.

Liverpool (789,532), at the mouth of the Mersey, stands second to London among the ports of Britain and is one of the world's largest trading centres. Most of the Canadian and many of the Boston and New York steamship lines have a Liverpool terminus. The chief imports are grain, cotton, provisions, tobacco, sugar, timber and fruit. Wool, salt, and the manufactured goods from Lancashire and Yorkshire are the chief exports. Liverpool ranks second to Minneapolis as a flour-milling centre and other industries

include engineering works, sugar refineries and cattle-food and seed crushing mills.

THE MIDLANDS

The Midlands is the name given to those regions which lie between the southern edge of the Pennines, the eastern Welsh mountains, the Cotswold Hills and the Northampton Uplands. The rivers Trent, Severn, Avon and Soar flow through the Midlands where the chief occupations are farming, mining, and manufacturing.

Cattle rearing is of great importance in most of the Midland counties and sheep rearing is carried on in the sandy districts of the plains and the limestone hills.

The noted dairy-farming areas are Northern Shropshire, east Leicestershire, and the district known as 'The Forest of Arden' in Warwickshire.

The Midlands are rich in both coal and iron. The coal-fields of north and south Staffordshire, Warwickshire, and Leicestershire and the York, Derby and Nottinghamshire coal-field provide coal for the varied heavy and light industries of the Midland towns.

Iron is mined in the Northampton Uplands and Corby is one of the greatest iron smelting and steel making centres.

Industries.—Earthenware and china are manufactured in towns near the north Staffordshire coal-field and this region is known as 'The Potteries'. The industry was based on the presence of local clays of good quality, but the finer clays are now brought in from Devon and Cornwall. Stoke-on-Trent is the most important town in this industrial region. Canals have been built to connect with the Mersey, Severn, Trent, and Thames Rivers. Iron ore for the steelworks and kaolin for the potteries are brought in by slow-moving barges. In this way, the Midland towns are able to compete in world trade although fifty miles from the nearest seaport. A network of railway lines connect with every part of central England.

Birmingham (1,112,000) is the second city of Great Britain and is the largest manufacturing city in England. It is the chief hardware centre in the world and is famous for its metal industries, which have been important since the seventeenth century. The specialized industries of Birmingham are numerous and include clocks, watches, jewellery, locks, scientific instruments, and electroplated wares which are all articles requiring a small amount of

raw material, but which are of considerable value as finished articles. Still other articles made in Birmingham are fire-arms, ammunition, glass, chemicals, brass wire, and beads. We also find Birmingham factories making railway carriages, steam-engines, waggons, automobiles, and machinery of many kinds. Most of these can be sent to their market in England under their own power, or to a seaport for export.

Wolverhampton, Walsall, Wednesbury, West Bromwich, and Dudley are other manufacturing centres of this region. They may be considered satellite towns of the Birmingham district. All are noted for the manufacture of iron and steel goods. Redditch makes needles and fish-hooks; Dudley makes grates, chains, and cables. Nails are made in several of these towns.

Leicester, in the county of Leicestershire, is situated at the foot of the limestone hills at the southern edge of the Midlands and is noted for the making of boots and shoes. Locally tanned leather was at one time wholly used for this industry but now the greater part of the leather has to be imported.

Leicester is also one of the great centres in the world for the knitwear industry. As with the leather industry, most of the raw material now has to be imported.

Accelerated by the needs of the second World War, engineering has become Leicester's major industry. Here is produced machinery for the boot and shoe and hosiery industries, together with typewriters, wood-working machinery, ventilating and cinema equipment and many allied products. Near the city are factories concerned with the research and production of jet engines.

Cattle and sheep are reared on the land surrounding Leicester and dairy farming is an important occupation. The famous Stilton cheese is made at Melton Mowbray in the county of Leicester.

Derby is another great industrial town of the Midlands. It is renowned for the quality of its engineering products and has large locomotive, wagon, and carriage works. The porcelain works in Derby produce the world-famous Royal Crown Derby porcelain and another world-famous name connected with the town is Rolls-Royce, whose factory was established there in 1906.

Nottingham.—The city of Nottingham is situated on the River Trent, and through this navigable river has access to the Humber ports. It is the centre of a coal-mining district. The chief industries include general engineering works, cycles, mechanical products, brewing, tobacco, and the manufacture of lace, hosiery,

and chemicals. Bleaching and dyeing works are also important in Nottingham and the tanning of goat-skins and the manufacture of kid and fancy gloves is another large industry.

Nottingham is the capital city of the county of Nottinghamshire, whose lovely countryside includes the famous Sherwood Forest of Robin Hood.

THE YORKSHIRE COAL-FIELD

The Yorkshire coal-field extends along the eastern side of the Pennines, from Leeds to Nottingham. Nearly 80,000,000 tons of coal are mined from this field each year, and the larger part of this amount is used by the industries of the region. The woollen industry of England is located on the Yorkshire coal-field. It is conducted on such a large scale that the number of sheep in England and Wales is unable to supply the factories with the wool which they require. Many million pounds of raw wool are imported.



Courtesy United Kingdom Information Office

THE CATHEDRAL OF YORK MINSTER, COMPLETED IN 1470.

Leeds, situated at the eastern end of the Aire gap, occupies a position in the wool trade comparable to that of Manchester in cotton. The many railway lines make the city a centre for the collection and distribution of raw wool and of many other supplies. The city is the largest ready-made clothing centre in the world, employing, in 1939, approximately 55,000 persons in this industry.

The engineering trade and the manufacture of iron rivals the woollen trade. The former includes both the casting of metal and the manufacture of machinery. Other industries of Leeds include leather manufacturing, furniture making, chemical and soap manufacturing, medicines, scientific instruments, cameras, and electrical appliances and accessories.

Within thirty miles of Leeds are a number of satellite towns engaged in the manufacture of woollen goods. Bradford, Huddersfield, and Halifax are noted for the making of worsteds, while Leeds and Morley make woollens. Woollens are made from carded, short-fibre wools and include flannels, tweeds, and blankets. Worsteds are the finer forms of dress material and are made from the combed, long-fibre wools. A large amount of shoddy, a kind of soft woollen goods made from old rags, is manufactured at Batley. Dewsbury and Keighley are important spinning towns. Halifax also manufactures carpets.

Although the wool towns are inland, they are really well situated for carrying on their large trade. The Humber extends to within twenty miles of the edge of the coal-field. Numerous rivers flow into the Humber. These have been deepened, canals have been built, and barges carry the wool to the manufacturing towns on the coal-field. The whole district is also linked by rail lines which form a part of the railway system of England. The Aire gap gives a low pass through the mountains to Manchester and Liverpool. On the Humber the large seaport of Hull and the river port of Goole are the principal import centres for the Yorkshire district.

Sheffield (513,000) is situated on the Yorkshire coal-field and is noted for its steel and steel products. Iron ore was worked in the vicinity in the twelfth century. The world famous Sheffield cutlery accounts for a large proportion of the industries and consists of knives, razors, scissors, and surgical instruments, agricultural, machine, and garden tools and coal cutting and boring tools. Another group of industries connected with cutlery is the production of silver and electro-plate goods and silver and gold refining. Ledges of millstone grit are found in the district and the grindstones made from this rock originally gave Sheffield its preeminence in the finishing of cutlery and tools. Other industries of Sheffield include coal-mining, type-founding, and brewing.

The River Don and its tributaries water Sheffield and except in the east, the city is surrounded by moorlands.

Doncaster, to the north of Sheffield, has a variety of industries including artificial silk, electrical equipment, brass, and rope

works. Its importance, however, lies in the fact that it is the centre of the richest coal-field in Yorkshire and is one of the leading manufacturing towns for locomotives and rolling stock.

THE TYNE BASIN

North of the Humber the Tyne River cuts its way through beds of coal which outcrop within a few miles of the shore. This is the famous Newcastle district. It was here that William the Conqueror built his 'New Castle' where the river flows between high, narrow cliffs, and where it was possible to throw a bridge across the stream. Since that time cheap fuel at tide-water has brought industrial development on a large scale. Newcastle coals are exported to London, and to Norway, Sweden, and other Baltic countries. Iron ore is mined from the Cleveland Hills, and more is imported from Sweden. Beds of salt form the basis of a large chemical industry.

The Newcastle district is noted for the manufacture of heavy steel and iron goods. Shipbuilding is important; nearly half the ships built in England are made in the dockyards of the Tyne and the Tees. Steel rails and bridge material, locomotives and railway cars, marine engines and heavy machinery are also made. A number of cities have grown up on the coal-field. Newcastle is on the north side of the river and Gateshead on the south side; Tynemouth, South Shields, and Sunderland are at the coast. In the valley of the Tees, there are the industrial centres of Darlington and Stockton. West Hartlepool and Middlesbrough are at the coast. The latter city is noted for its blast furnaces and rolling mills.

THE SCARPLANDS

A limestone ridge borders the midland plain on its eastern and southern sides. The ridge may be traced from Devon to the Cleveland Hills of Yorkshire. South of the limestone there is a clay vale which slopes gradually to the Wash. This vale is flanked on its southern side by a chalk ridge which runs from Portland Bill to Norfolk. Parts of the ridge have local names such as Salisbury Plain, the Chiltern Hills and the East Anglian Heights. An extension of the chalk ridge eastwards in two arms is known as the North and South Downs. These enclose the district of the Weald. South of Salisbury Plain are the clay soils of the Hampshire basin, while the London basin occupies the area between the North Downs and the East Anglian Heights.



Courtesy United Kingdom Information Office

WHERWELL VILLAGE, HAMPSHIRE.

With these general considerations in mind let us examine each part in particular. The clay vale running north-eastwards to the Wash is another cattle-raising and dairying district. It is here that we see the fertile, gently sloping lands of old England. The small fields are bordered by hedge-rows, while here or there a market town looks after the trade of the surrounding district. Oxford was one of these towns. Its present size is due to the university and the recent growth of an automobile industry. Cambridge is another university town. It is situated on the clay land, only a short distance from the flat fenland of the Wash. Buckingham, Huntingdon, and Bedford are other clay-vale centres.

Eastern England has much less rain than the western part of the island. For this reason wheat is a staple crop on the drier lands of the east. The average yield in East Anglia is thirty bushels to the acre. Oats and barley are also grown. Mangels and turnips are grown for winter feed for cattle; potatoes are a common food crop.

The fenlands around the Wash resemble the low-lying districts of Holland. The fens have been dyked and drained and now produce wheat, root crops, potatoes, and sugar-beet. Lincoln, Peterborough, and Bedford manufacture agricultural implements. Iron is mined from the limestone ridge and there are blast furnaces at Kettering and Scunthorpe. The Wash is gradually silting up so that the old seaports of Boston and King's Lynn are today of little use.

Sheep.—The number of sheep in Great Britain is remarkable for an island so highly industrialized. The people of Great Britain have been raising sheep since the time of the Roman occupation. Interference with the export of raw wool to Flanders was one cause of the Hundred Years' War. The sheep are pastured throughout the Pennine moorlands, on the slopes of the Cotswold Hills and in the Northampton uplands, and on the chalk ridges of the Chiltern Hills. The North and South Downs and Salisbury Plain are also noted sheep lands. In fact, wherever there is rough, rugged country and well-drained slopes with short grass, sheep are reared. The English farmer specializes in raising prize stock. Each market town has its annual fall fair and sale of prize animals. Many of these are sold overseas for breeding purposes.

THE WEALD

The Weald is that section which lies between the North and the South Downs. Here a large area of clay land, the vale of Kent and the vale of Sussex, surrounds an island of waste forest land, known as the Hastings Sands. The growing of hops, wheat, root crops, and dairying are the chief agricultural pursuits. Sheep are pastured on the downs. There is little in the way of manufactures, owing to the absence of coal. Gaps in the chalk downs have been utilized by the railway lines which run south from London to the various channel ports.

Dover is the principal port, a strong naval base and packet station. It is only 22 miles from Calais. The crossing of the Channel can be made in an hour, but the winds and the strong tides often make it a passage long to be remembered. Folkestone has packet connection with Boulogne, 26 miles distant, and Newhaven with Dieppe. A number of summer holiday places are



Courtesy United Kingdom Information Office

Every Englishman returning home after a trip abroad fixes an eager eye on the horizon for the first sight of the white cliffs of Dover.

dotted along the coast. Brighton is the largest of these. Others are Eastbourne, Hastings, Ramsgate and Margate.

The old city of Canterbury is built on the fertile clay land which slopes towards the Thames estuary. It is the most noted cathedral town in England. South of Canterbury the main road through the Stour gap connects with Ashford and the vale of Kent.

THE HAMPSHIRE BASIN

The Hampshire basin may be described as a chalk trough filled with clay. It is ringed with chalk ridges, the Dorset Heights in the west, Salisbury Plain to the north, and the South Downs on the east. The chalk ridges reappear in the southern part of the Isle of Wight. Some parts of the Hampshire basin are overlaid with coarse gravels and sand. Where the soil is too poor for agriculture, tree growth is encouraged, principally oak, beech, and pine. The New Forest, which lies west of Southampton Water, occupies such an area. On the clay lands there is dairying and mixed farming. The Hampshire basin is one of England's beauty spots. The Isle of Wight has such a mild climate and the soil is so productive that it is known as 'The Garden of England'.

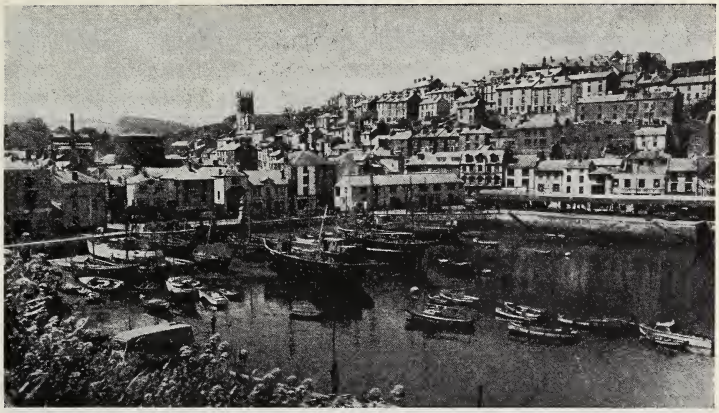
Two great harbours have been developed in the protected waterways which lie behind the Isle of Wight. Portsmouth stands at the entrance to a large landlocked basin. It is England's chief naval station and dockyard on the Channel. At the head of the estuary, is the port of Southampton, noted as a passenger and mail terminal. Fast Atlantic liners arrive at Southampton where express trains are waiting. Soon, passengers and mails are speeding north-eastwards by rail, eighty miles to London.

Some of the liners, after calling at Southampton, proceed on their way to Havre, Rotterdam, or Hamburg, as the case may be.

The old city of Winchester was once the capital of Saxon England. Salisbury, to the west, has one of the most beautiful cathedrals in the country.

SOUTH-WESTERN ENGLAND

South-western England is a peninsula composed of a number of masses of granite extending from Somerset to Land's End. Exmoor and the Blackdown Hills border the north side of the fertile plain of Devon. Then comes forbidding Dartmoor, followed by the Tamar valley and Bodmin moor. The moors are bleak, rugged, and wild, in sharp contrast with the peaceful and fertile lowlands. The almost insular climate of Cornwall makes it possible for the



Courtesy United Kingdom Information Office

View of the inner harbour at Brixham, South Devon, where the fishing boats are lying waiting to go out. On the right is the fish market.

farmers to send early cut flowers, daffodils, narcissi, and lilies to the London market. Early potatoes and asparagus are also grown. Kaolin, or china clay, is exported to the pottery towns of the Midlands. Copper and tin are practically exhausted, only a very small quantity of ore being sent to Swansea. Plymouth, which won renown in the days of Drake, is still an important naval base. It is used as a port of call by ocean shipping, and is the chief trading centre of south-western England.

THE LONDON BASIN

In our discussion of southern England we have left the London basin until the last. Its commercial importance warrants this special treatment. The basin is another large chalk trough, filled with clay and gravels of glacial origin. It lies between the Chilterns and the North Downs, with the River Thames draining easterly into the North Sea.

The importance of the Thames estuary is due to the fact that it is opposite the mouth of the Rhine and that the Thames is the best water route into the heart of England. The fertile soils of the London basin yield enough agricultural products to support a large industrial population, even if there were no importation of foods from abroad. Garden truck is grown for the London market and dairying is important. The sandy areas are covered with pine and fir woods, and these sites are now being used as suburban residences for the Londoners. The poorer gravels are heath lands

as at Aldershot, Blackheath, and Hampstead Heath. Aldershot is a well-known military training-ground.

London began on the Thames, twenty miles up stream, where it was possible to throw a bridge across. The Romans built their roads out from London, and during the Middle Ages the city continued to be the important commercial centre of southern England. The Normans made London the capital of the country, and it was the only large city in Britain until the use of coal and iron in the nineteenth century made possible the development of manufacturing centres such as Birmingham, Leeds, Manchester, and others.



Courtesy United Kingdom Information Office

LONDON FROM THE AIR.

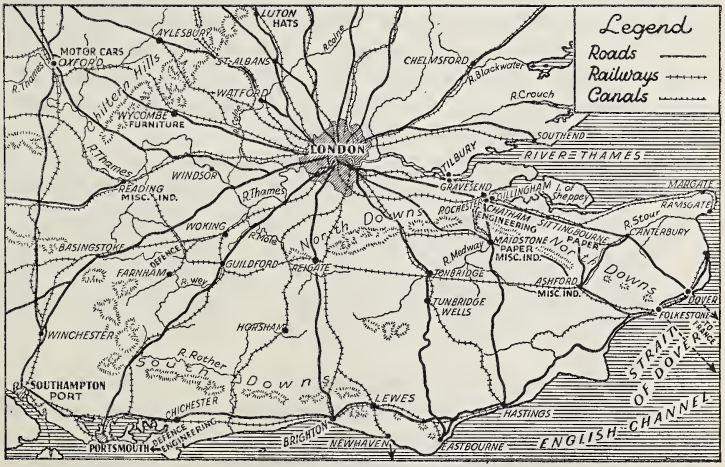
Despite the development of these new cities London continued to grow. During the nineteenth century railways sprang out from London, like spokes from the hub of a wheel. With no coal or iron nearby, London, because of its geographical position and fine internal communications, has become the largest city in the world and its most important trading centre. London controls 38% of the import trade of Great Britain and handles 27% of the export trade. Liverpool comes next in importance as a port. The population of Greater London in 1951 was 8,346,137.

The London docks have been dug out of the low marshlands which once bordered the river below London Bridge. Here are the Albert Docks, the Tilbury Docks, the India Docks, and many

others. The Port of London Authority owns the larger docks and warehouses. There are elevators for wheat, warehouses for wool, cold-storage plants to receive frozen mutton or chilled beef. Still other docks and warehouses are noted as receiving centres for spices, coffee, cocoa, leather, hides, and ivory.

The ease with which any commodity may be shipped in from abroad, and the means of distribution to any part of England, make London the chief receiving and distributing centre of Britain. The growth of the Empire, up to the first World War, still further enhanced the power and size of the old city. Trade and finance go hand in hand. London is a financial centre of world importance with the Bank of England located there. Here, too, are the Houses of Parliament, noble buildings on the Thames Embankment. There are also the Law Courts, Buckingham Palace, streets of office buildings and hotels. Many factories and commercial establishments have a London office. For this reason London has become the Mecca of the travelling salesman, for the man who has things to sell or things to buy. It is difficult to estimate the number of people who come to London each year to see the sights and to be able to say, upon their return home, that they have been up to London.

London has spread out until it occupies land on both sides of the Thames for a number of miles above and below London Bridge. Transportation of goods across the city, from warehouse or factory to store, has become a problem. Some streets have been



THE POSITION OF LONDON

widened, others carry one-way traffic only. It is wonderful how quickly the huge traffic moves through the winding streets. The London buses carry the people to and fro, but there are also underground railways, which are loaded to capacity during the morning and evening rush hours. Then there are trains which run into and out of the stations every few minutes, day and night. The Canadian who visits London is amazed to see so many people, all bent on getting somewhere for some purpose. These, and the others who work away quietly in the long rows of brick buildings, are helping to conduct the business of one of the most orderly cities of the world.

Scotland

The northern part of Great Britain, which we know as Scotland, has three natural physical divisions, the Highlands, the central Lowlands, and the southern Uplands. Three-quarters of the people live in the central Lowlands.

THE HIGHLANDS

The Highlands consist of old, hard crystalline rocks, scored and cut by glacial action. The higher mountains are bold, bare rock masses. These slope down to treeless moors where bracken, heather, and peat bogs abound. The glens or river valleys are forested with spruce and broad-leaved hardwoods as in New Brunswick and Quebec. The beauty of the scenery is well known, and Scott has immortalized the Trossachs in his poem *The Lady of the Lake.* Where the Highlands reach the sea we find long fjords or inlets. The watershed of the mountains lies near the western coast and the more gradual slope is towards the south-east. Ben Nevis, 4,406 feet, is the highest peak.

Life in the Highlands is hard. Wherever a patch of fertile soil is available we find the low stone house of the crofter, his garden patch, a cow, and a flock of sheep. The sheep are grazed on the hill-sides which provide a scanty pasturage. The population does not increase. Many of the young men and women go to the Lowlands to find work in mine or factory. Others have emigrated to Canada or other parts of the Empire, where they make good pioneers.

The eastern coast of Scotland presents a very different appearance from that of the west. The crystalline rocks dip under a sheet of old red sandstone formation. This has weathered into a fertile soil, and a well-defined plain borders the shore of the North

Sea. Oats and barley are grown and cattle are grazed on the pastures. By contrast, the eastern plain is a fair and smiling land.

Aberdeen (182,700) is the one large city in the Highlands. It ranks next to Grimsby as a fishing centre for the North Sea trawlers. The smoking, curing, and packing of herring gives employment to many people. Railway lines run north along the plain and south to Dundee and Edinburgh. Granite and slate are quarried and there is a large export of building-stone. Boat-building, sail-making, and the manufacture of woollens are other industries. Inverness, on Moray Firth, is sometimes called the capital of the Highlands. It is a tourist centre. A direct rail line crosses over the Drumtochter Pass and down to Perth.

The Orkneys and the **Shetland Islands** are outliers of the Scottish Highlands. The Orkneys are comparatively low and are covered with a part of the old red sandstone sheet. The sea has cut into this softer rock, and Pentland Firth now separates the Orkneys from Caithness. Agriculture, rearing of cattle, and fishing are the chief occupations of the people. Kirkwall, the largest port, is a trawling centre.

The Shetland Islands are ridges of crystalline rock. The soil is poor and thin. Small garden patches are tended with care. Sheep and ponies are reared on the grass-covered hill-sides. The population is small, 28,000, and fishing is the leading occupation, with Lerwick the chief port. Products of cottage industries are hand-knitted hosiery and woollen goods.

THE SOUTHERN UPLANDS

The southern Uplands are a plateau of ancient shales and limestone. A few of the higher ridges are a little over 2,500 feet in altitude. The general slope is south-easterly and the Tweed, Teviot, and Esk flow into the North Sea. The Uplands and the Cheviot Hills form a natural barrier between England and Scotland. Hadrian's Wall followed the line of the Tyne gap and across to Solway Firth. In later times the natural dividing line became the River Tweed, so that when we cross the Tweed we may say we are in Scotland.

The limestone ridges of the Uplands are porous and treeless. The lower slopes are covered with a coarse grass. This has made the Uplands one of the principal sheep-raising districts of Britain. Water-power developed on the Tweed is used in woollen factories

and Peebles, Galashiels, Hawick, and Selkirk are known for their woollen goods. Agriculture and dairying are carried on in the river valleys.

THE CENTRAL LOWLANDS

The central Lowlands lie between the Grampians and the southern Uplands. The Lowlands of Scotland occupy a rift valley which dropped down when the rock masses on either side were being forced upwards. The valley is drained by the Clyde, Forth, and Tay Rivers. The fertile soils of this area make it the garden of Scotland. Dairying, truck gardening, and fruit-growing are the main agricultural pursuits. The large centres of population form a local market for all that the farmers can produce.

Industrial development.—The fertility of the soil, however, does not alone account for the fact that 3,000,000 people have their homes in a valley fifty miles wide and a hundred miles long. Further examination reveals three coal-measures, the Ayrshire Field, the Lanark Field, and the Fifeshire Field. It is upon these fields that the industrial development of the region is based.

The Ayrshire Field exports a large tonnage of coal to the Belfast district of northern Ireland, eighty miles distant. Kilmarnock has woollen manufactures and engineering works.

The Lanarkshire Field supplies about 45% of the Scottish coal. When the field was first opened, a form of ironstone was found along with the coal-seams. The black band ironstone contained sufficient carbon to make the smelting process an easy matter. However, these seams have been practically exhausted and now the iron and steel industry of Lanarkshire depends mainly upon import of ore from Sweden. Falkirk is one of the oldest of the smelting towns. The start which it secured has been maintained although the original ironstone has been exhausted. Still other smelting and engineering centres are Coatbridge, Motherwell, Wishaw, and Airdrie.

Shipbuilding.—The Clyde River cutting its way across the coalfield, and the presence of iron, have each helped to make the Clyde, from Glasgow to Greenock, the greatest steel shipbuilding centre in the world. To this we must add frugal habits of Scottish workmen and a relatively low wage scale, which is a decided advantage in competitive bidding in world shipbuilding markets.

Shipyards line the Clyde for a distance of ten miles on either bank. Greenock, Dumbarton, Clydebank, and Port Glasgow con-

tain the principal yards. One-third of all the ships constructed in the British Isles are built on the banks of the Clyde.

Many things enter into the construction of a ship. Engines, boilers, and propellers must be made; thus, in and around Glasgow, there are a number of firms which specialize in this work. The steel plates and ribs may be rolled at the mills of the smelting towns mentioned above. The woodwork for the interior finishing of the vessel makes it necessary to have lumber suitable for this work imported and kept in a well-seasoned condition for immediate use. All these things give employment to many people beside those who are actually engaged in fabricating the ship in the yard.

Glasgow (1,089,555) is the centre of trade for the whole of the western Lowlands. Railway lines spread out to the north, east, and south. Glasgow also carries on a direct trade with North America. Bristol, Liverpool, and Glasgow are the great western ports of the British Isles. Numerous industries centre in Glasgow. There are important chemical works, a growing pottery industry, and large textile factories. The latter industry provides work for the women while the men find employment in the engineering, mining, and shipbuilding trades. Sugar from the West Indies is refined at Greenock. Paisley, a few miles west of Glasgow, is the centre of the cotton and linen-thread industry. Paisley thread is exported to many countries.

The Fifeshire coal-field dips under the Firth of Forth and reappears along the Edinburgh-Haddington coast. This part is sometimes called the Midlothian Field. It is estimated that one-half the remaining coal in Scotland is now in the Fife-Midlothian coal basin. The Fife Field exports coal from the ports of Methil and Burntisland to Scandinavia and Baltic countries. Leith, on the southern shore, is also an exporting centre.

The proximity of the flax-fields of northern Europe has been a determining factor in the growth of linen manufacturing in Dundee, Dunfermline, and other places. Dundee is also noted for the making of hemp cordage and of sailcloth. Both these industries depend for their market upon the fishing industry of the North Sea. Dundee is the largest importer and manufacturer of jute. There are shipyards here and it is the home of the Arctic whaling fleet. Dundee also manufactures preserves, notably marmalade.

Kirkcaldy is noted for the manufacture of oilcloth and linoleum. The jute comes from India, the cork from Spain.

Edinburgh (466,770), the capital of Scotland, is built on and around Castle Rock. In other days the city commanded the approach to the Lowlands of the west and the route along the eastern plain to the south. Today it is an educational as well as a trading centre. Its School of Medicine has gained world renown. Through its port of Leith, wood pulp and esparto grass are imported, and paper-making is one of the basic industries. Large publishing firms have their factories and binderies in Edinburgh. Barley is secured locally and some is imported for the large distilleries and breweries which are located near the city.



Courtesy United Kingdom Information Office

PRINCES STREET, EDINBURGH.

Stirling and Perth are 'gate' cities. Each is at the head of navigation of its particular stream, and each lies in a plain between rough hills. Their ancient military importance has departed, but they still control the trade of the upper Forth and upper Tay valleys.

IRELAND

Ireland presents a relief quite distinct from that of Great Britain. It may be described in a general way as a central plain bordered by groups of mountains. In a number of places the plain comes down to the coast. It is seldom more than 300 feet above sea-level and consists of great beds of limestone which have remained practically undisturbed. The Pennine Chain of England is composed of the same material, but rounded and bent into a

mountain fold. Over the limestone of the Irish plain large masses of boulder clay have been deposited by the ice-sheet which once covered this land. The surface is now gently undulating, with rivers and small streams draining the lower parts.

Peat-bogs.—About one-eighth of the whole area is covered by peat-bogs. These are soft, wet masses of decayed vegetable material which has collected in shallow lake beds. In this way peat has been formed. The Irish farmers cut this material into small cubes, stack them, and let them dry. When ready for use peat has about half the value of coal. Since there is almost no coal in Ireland the peat is a valuable source of fuel.

Agriculture.—Ireland receives the full force of the westerly winds. It is surrounded by salt water, has a mild and equable climate, and the rainfall is heavy throughout the year. For these reasons grass grows luxuriantly throughout the spring, summer, and fall, and Ireland is often called the Emerald Isle. Nine-tenths of the plain is in permanent pasture; less than one-tenth is cultivated. Dairying is the chief industry, and there is a large export of butter, cheese, bacon, eggs, and live cattle to England. The pigs are fed on skimmed milk and small potatoes. Oats, barley, and potatoes are grown on the land suitable for ploughing.

THE REPUBLIC OF IRELAND

Dublin (170,106) is the one large city of the Republic of Ireland. It is well situated for trade with England via Anglesey, and rail lines branch out to all parts of the plain. It is the capital of the state, and an educational, administrative, and business centre. Canals connect with the Shannon and the farmers bring their produce cheaply to market. The Lancashire district is a great market for Irish produce. Breweries and distilleries are located in Dublin. These depend upon barley grown on the central plain. There is a large export of both malt and distilled liquor from this centre. Drogheda, on the Boyne, and Dundalk further north also export dairy products to England. Linen is manufactured in all these towns from flax grown locally.

It will be noted in the map that there are no large towns on the plain itself. The towns that have grown up along the eastern coast owe their prosperity to their trade connections with England. Galway, which once had a considerable trade with Spain, has declined in importance. Limerick, on the Shannon, is now the chief port of the south-west. It is an export centre for the lower

Shannon valley, and of the plain to the south, for cattle, hogs, and bacon. Lace-making is an important industry in this section. Much of it is made by the cottagers to help out the income from the farms.

Western Connaught resembles the highland region of western Scotland, although on a much smaller scale. The soil is poor and thin and the population is scanty.

South-eastern Ireland consists of a number of drowned valleys lying between the rock masses. Valentia Island, at the entrance to Dingle Bay, is the terminus of several transatlantic cables. Cork, on the Lee, is the largest city of this section. Dairy products are exported to Bristol in large quantities. Cobh (formerly Queenstown) is a port of call for Atlantic liners. Waterford and Wexford are smaller ports which send dairy products to England.

Because of the dampness of the climate, Ireland is not as suitable for sheep as is Great Britain. It is not surprising, therefore, to find 2,182,000 sheep as the total number in a land larger in area than Scotland. Hay, oats, potatoes, barley, turnips, and mangels are grown. These crops are used by the cattle and dairying industry upon which the prosperity of the people depends.

Manufacturing as we have seen it in England and in Scotland is of little importance in the Republic of Ireland.

NORTHERN IRELAND

Northern Ireland comprises the six counties of Londonderry, Antrim, Down, Armagh, Fermanagh and Tyrone. This is the old Ulster district of Ireland. Apart from the mountain areas, the Ulster plain is fertile and produces large crops of hay, oats, barley, and flax. Lough Neagh and the Bann valley are noted for their fine farm lands. The people are intensely loyal to England and refused to join the Irish Free State when it was formed in 1921.

Belfast (443,670), at the head of Belfast Lough, is the large industrial centre of north-eastern Ireland. It is noted for its great shipping yards, which turn out some of the largest vessels afloat. Yet within the confines of Ulster there is only one small coal-field at Dungannon, south-west of Lough Neagh. The shipyards and machine works of Belfast rest on a different basis from those of the Clyde or the Tyne. Labour is cheap in northern Ireland, land is cheap, and the shipyards have an excellent location for launching large vessels. Coal can be brought in from Ayrshire, 80 miles distant by water. Iron and steel come from the Barrow mills in Furness, 111 miles distant.



Courtesy United Kingdom Information Office

Once a month at fair time, Garrison, a border village of Northern Ireland, springs to life.

The famous linen mills originally drew their supply from the fertile lowlands, but the demand has gone far beyond the domestic supply and there is a large import of flax from Belgium. Rope-making, tanning of leather, and brewing are other industries of the Belfast industrial district. Out of the total population for Northern Ireland, one-third live within a few miles of the head of Belfast Lough. The linen industry provides employment for approximately 110,000 persons and linens form an important export from Northern Ireland.

Londonderry, at the head of Lough Foyle, is a manufacturing and trading centre on a small scale. It is particularly noted for the making of shirts. The cutting and finishing of the shirts are performed in Londonderry factories; the sewing of them is carried on in the homes of the people in the surrounding district.

The industrial north of Ireland seems to have a better economic basis than the agrarian south.

EXERCISES

1. Travellers in England often speak of the rain and the lack of sunshine they experience in England, yet a fairly large area in the east of England has under twenty-five inches of rainfall in a year. How does this compare with the precipitation in your district? What parts of England have more rain than we do? It happens that these are the parts most commonly visited by tourists. Why is the rainfall more abundant here? Compare the total rainfall in London with that of Toronto, Montreal, and Halifax. In spite of what you discover, London has less sunshine than we have. Can you give any reasons for this?

2. Where is the wheat-growing district of England? Explain the reasons for this location. Why has oatmeal, in the past, been a more important food for the Scotch than wheat?

3. Glasgow, Leith, and Dundee are three important ports in the Rift Valley of Scotland. Give as many reasons as you can to explain why Glasgow has become the most important of the three.

4. The greatest wool manufacturing district in the world is found around Bradford, Halifax, and Huddersfield. Locate these places. Why was the industry first developed here? Why has it continued here to the present time? What are the present sources of raw wool for these mills?

5. Why are most of the winter resorts in England situated in Cornwall and Devon?

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21

THE NORTH SEA AND BALTIC COUNTRIES

Denmark, Scandinavia, Finland, Estonia, Latvia, Lithuania, Poland, Germany, The Netherlands, Belgium, France.

We shall now describe that part of Europe which borders the eastern side of the North Sea and the lands surrounding the Baltic. Before the second World War and the consequent assimilation of a large part of this region into the U.S.S.R., a large trade was carried on with other countries and particularly with Great Britain who was their best customer. This trade is still maintained in those countries which have not come under the domination of the U.S.S.R.

Denmark

Denmark, a monarchy, is the smallest of the Northern States and occupies the peninsula of Jutland, a low, sandy tongue of land separating the North Sea from the Baltic Sea. No part of the peninsula is over 600 feet in altitude, and the area is a little larger than that of Belgium or the Netherlands. The population is mainly dependent upon agriculture and no other European country has developed this industry to such a high degree of excellence. The country has no coal, no iron and no mineral ores of any kind.

The western shore of Denmark is lined with sand dunes. Behind the dunes are shallow lagoons and marshes. Tough grasses have been planted on the dunes to keep the sand from blowing inland. Drainage canals have been dug, the sandy soil has been enriched by means of marl and fertilizers, and now, after much labour, the waste land has been reclaimed. The eastern side of the peninsula is fertile clay soil, and the islands of Zealand, Laaland, and Funen are as productive as any part of the peninsula.

The industry and foresight of the Danes is admired by other peoples. Their agricultural schools and their co-operative societies are models for others to follow. The people are loyal, happy, and contented, and farming is their great endeavour. There are only

7,000,000 acres of arable and pasture land in all Denmark, 20% of the country being unproductive. The farms are of small size; eight acres are made to support one family. One-half of the farms are under forty acres, and very few farms are a hundred acres in extent.

The chief crops are typical of a cool climate being oats, barley, rye, wheat, roots, and potatoes. Sheep, cattle, horses, pigs, and poultry are reared and bacon, butter, cheese, and eggs are produced in large quantities and constitute the major portion of Denmark's export trade. Industrial Britain across the water has for many years been the chief market for this trade.



Courtesy Government of Denmark

A Danish farm in South Fünen, called 'the garden of Denmark'.

Co-operative societies have made the Danish farmer what he is today. These societies are found in every district. The central organization collects the milk at the farm each day. It is taken to a creamery, graded, and the skimmed milk returned to the farmer so that he may feed it to his pigs and poultry. The butter is sold by the association and the net proceeds paid to the farmer. In this way the producer gets the best possible price and the consumer in England buys a standard article.

The fishing industry of Denmark compares in value with that of Nova Scotia and is increasing in importance. A great number of small boats are used because of the shallow water around the coast. Herring and flat-fish are taken. Esbjerg is the best harbour and the chief fishing port.

Copenhagen, the capital, is the one large city of Denmark. It is well situated to control trade passing through the 'Sound', the narrow opening between the Cattegat and the Baltic. The city is a large collecting and distributing centre for products of the Baltic region. Ocean-going vessels often unload at Copenhagen, the cargo being distributed by smaller vessels to various Baltic ports. These vessels also collect the products of the Baltic countries and bring them to Copenhagen, where large freighters load for Britain and other markets.

There is little manufacturing in Denmark because of the lack of coal. From the abundant clays a fine porcelain is made. It is used in cream separators, churns, and milking machines which the Danes make for their own use and for export. There are also factories which make tools and farming equipment.

Scandinavia

Norway and Sweden divide this peninsula between them. The people are akin to the Danes and speak languages of the Germanic family. Centuries ago a king of Denmark ruled over Norway and over England as well.

The peninsula is formed of an elevated plateau which rises steeply from the Atlantic, but slopes gradually to the Baltic. Norway occupies the narrow strip along the western seaboard; Sweden, the eastern slope and lowlands facing the Baltic. From 1814 to 1905 the peninsula was under one government, but the two regions have divergent interests, and it was decided that each should have a government of its own. The mountain barrier makes communication by land from the west to the east coast almost impossible.

NORWAY

Sailing along the coast, one is struck by the regular outline of the crest of the plateau. For this reason the sailors named it the Kiolen Mountains, from its likeness to the keel of an upturned boat. The fjords wind their way into the highlands like the inlets and canals along the coast of British Columbia. Both fjords and inlets have been caused by the same agent, the glacier or river of ice. The sides of the fjords are steep, and often rise to a height of 4,000 feet. At the head of the fjord there are meadow lands and a stream coming down from the mountains. Along the coast we find the 'skerry-guard.' These small, rocky islands are a protection from the Atlantic waves and there is an almost con-

tinuous, quiet water route in the lee of the islands. In the days of the Viking longboat the protecting islands were a great help in developing a race of sailors.

The annual rainfall of Norway is from forty to sixty inches and the climate is oceanic in character. The harbours are open throughout the year, owing to the influence of the mild west-wind drift-current of the North Atlantic. Similar conditions prevail on the west coast of North America.



Courtesy Richard Mathews

Few scenes can rival the setting of the hamlet of Merok, in the Geirangerfjord.

Industries.—The people of Norway make their living principally by means of agriculture, lumbering and fishing. The Norwegian farmer places his dependence upon cattle, sheep, and goats. There is so little good soil that hay for the animals and some garden truck is all that can be grown. The mountain sides and the plateau supply summer pastures or 'saeters', to which the animals are driven as soon as the weather permits, which is generally in June. Cheese and butter are made from the milk during the time that the animals are in the high pastures. In September, the herds are brought down to the villages, which are never far from salt water. During the short summer, hay is harvested from the village meadow lands, and lower hillside pastures. Here and there are a few fields in oats or barley.

The rainfall and the mild climate promote a good forest growth and lumbering is an occupation which gives employment to many a young farmhand during the winter season. The logs are brought down to the streams by sled, as in Quebec, and stream-driven dur-

ing the spring freshets to saw-mills at the heads of the fjords. Wood-pulp and paper, however, constitute the chief export from the forests of Norway.

Since the beginning of the twentieth century, when hydro-electric power was first used for large-scale industry, many manufacturing industries have grown up. Iron ore and iron pyrites are mined, as well as some nickel and lead-zinc ores. Electricity is used in the refining of these materials and in the manufacture of aluminum and ferro-alloys. The metal industry of Norway is important, giving employment to many people, and is based on the utilization of a natural resource, the power of falling water. Electrical stations provide one of the largest *per capita* hydro-electrical developments in the world.

Fishing is still a major industry of the Norwegian people. Cod and herring are the chief fish caught, while the little brislings are used as sardines. Larger vessels go out after whales and seals. The Lofoten Islands are the principal area for the cod fisheries. As many as 30,000 fishermen are thus engaged from January to June. Hammerfest and Tromsö are the leading fishing towns. At Hammerfest there is a period of eleven weeks during which the sun does not sink below the horizon. Cod-liver oil is an important export. Trondhjem and Bergen are noted herring centres. Brisling are canned at Stavanger.

Oslo is the capital and largest city. It is the focal point of the only large lowland area in Norway, and of the route which leads north to Trondhjem. One of the invisible sources of wealth is the Norwegian interest in shipping. Norway faces the busiest sea in the world. Three-fourths of the population live within a few miles of salt water and many thousands are engaged in fishing. Norway sells fish, oil, pulp, paper, timber, and metals. These must be carried to market. In return come the cotton and woollen goods for clothing, wheat for bread, coal, and many manufactured articles. The Norwegian shipowners have also entered the carrying trade of the world and make a business of carrying goods for other people. Thousands of Norwegians are engaged in merchant shipping and this may be considered one of the industries of the country. The fisheries train the sailors, while the prudent honesty and thrift of the people enable them to hold their own in competition for world trade. Norwegian vessels are found in the ports of every continent.

SWEDEN

Sweden is larger in area than Norway and has twice the population. It occupies the eastern and more gradual slope of the plateau which forms the backbone of the peninsula. Sweden faces the Baltic, and fishing is not the important industry that it is in Norway, nor is shipping conducted on such a large scale. The Baltic is frequently frozen during the winter months and hinders the development of maritime trade.

Agriculture is the important industry of Sweden, engaging nearly half the population. The southern province of Scania resembles Denmark in configuration. Barley, oats, rye and some wheat are grown, and a large acreage is devoted to sugar-beet. Dairying is carried on, and the farmers of Scania export butter, eggs, and bacon to the British market. Steamers ply from Malmö to Lübeck and to Copenhagen. Ice-breakers are used during the winter months to keep the harbour open. Factories manufacture cotton and leather goods.

To the north of Scania a depression or trough extends from the Skagerrak to the Baltic. This was once an extension of the Gulf of Finland. A canal runs from Göteborg to Stockholm, 350 miles, but there are more than sixty locks in this distance and passage through the canal is slow.

Goteborg is the chief seaport of Sweden. It exports dairy products, iron ore, and forest products to Britain. Sweden is densely forested and there is a steady demand for the fine, even-grained wood.

Forest products.—It is the policy of the Government to export as much as possible of the timber in a finished form, and there are a large number of pulp and paper mills, lumber mills and sash and door factories. These are found near the seacoast and use a large amount of electrical power, as in Norway. Matches are made at Jönköping on Lake Vetter.

Iron ore is mined north of the trough; it is smelted in electrical furnaces, and charcoal is used in the manufacture of high-grade steels for such articles as ball bearings, carpenter's tools, and surgical instruments. Dannemora is the chief centre of this industry. Norrköping specializes in the manufacture of textiles. The mills are run by electricity.

Stockholm, the capital city, has a beautiful location at the entrance to Lake Mälar. It is centrally located to control the trade of the Gulf of Bothnia, of Finland and the northern Baltic.



Courtesy Richard Mathews

Along the waterfront are many of Stockholm's most prosperous business houses.

Iron mines lie to the west, the forest stretches out on three sides, and the city is a distributing point and commercial centre for large industries. Manufactures include agricultural implements, dairy machinery, and machines for the lumbering and pulp- and paper-making industries. Railways connect Stockholm with Malmö, Göteborg, and with Trondhjem in the north. The country north of Stockholm is a great forest with lumbering the chief industry. A few areas have been cleared and mixed farming is carried on.

Iron ore.—In the far northern part of Sweden there is a very large deposit of iron ore. The ore runs 65% iron and is of exceptional quality. During the summer season the ore is brought to the seaport of Lulea, in winter it is sent to the ice-free Norwegian port of Narvik. The railway, one of the most northerly lines in Europe, is run by electricity. Some of this ore goes to England and to America. Sweden is one of Europe's chief iron-producing countries.

Sweden, like Norway, must import large quantities of bread grains, and milled feeds for the cattle. Lumbering is on a large scale and Sweden is Canada's competitor in the sale of pulp and paper. Although the people of Sweden import some coal, the electrification of their industries saves a large fuel bill each year. The backbone of the peninsula is proving to be a wonderful asset to both Norway and Sweden.

Finland

Finland is one of the far-northern countries of Europe. The Finns are a remarkable people, and have adapted themselves to a difficult environment in a wonderful way. When we note that Finland lies north of 60°, that it is in the same latitude as Greenland, Labrador, and Alaska, the number of its inhabitants tells in a marked degree of the adaptation of man to nature. The Gulf of Finland and the Gulf of Bothnia are frozen over during four months of each year. Snow lies deep on the hills and sledges are used to carry the mails over the ice to Sweden. Spring comes with a rush, the rivers become roaring torrents as the ice blocks their channels. The long days of summer bring about a rapid growth of vegetation, and the farmer and his family must work sixteen hours a day to get the seeding done. Autumn is a rush period to harvest grain and root crops before the winter freeze-up.

Northern Finland is a land of muskeg and dwarf birch. Very few people live in this part. The Lapps subsist largely on their herds of reindeer. Central and southern Finland are covered with a dense coniferous forest. Logging is carried on during the winter. In the spring the logs are stream-driven to the saw-mills and pulp-mills which stand near the coast. The mills are run by electricity as in Quebec, Norway, and Sweden; 80% of the Finnish exports consist of timber, wood pulp, and paper. Matches, veneers, and artificial silk are also made. The chief revenue of Finland comes from its forest products.

Although only 6% of the land is cultivated, agriculture in some form is the major occupation of the people. Many of the farmers work in the woods during the winter time until the log drive, when they return to their farms for the summer season. The chief crops are oats, barley, rye, potatoes, and hay. These indicate a cool, moist climate. Dairying is important; over 1,500,000 cattle are kept, as well as pigs, sheep, and horses. The latter are useful in the woods as well as on the farms. The farms are generally of small size with less than twenty-five acres under the plough. Butter, cheese, bacon, leather, and hides are exported to the manufacturing countries of western Europe. The chief imports are wheat, milled feeds for the stock, sugar, spices, and oils.

Helsinki, the capital and largest city, is situated on a good harbour in southern Finland, opposite Tallinn. It is the chief port of the country. There are a number of small industrial establishments which make agricultural machinery and implements and

logging equipment. Tampere has a large cotton-spinning and weaving industry, based on a supply of electricity and a damp climate. Turku, the old capital, is a manufacturing centre and trades with the Aland Islands and with Sweden.

The many glacial lakes which dot Finland are natural storage reservoirs for the streams. During the last thirty years the Finns have developed the use of electricity thus making possible an important pulp and paper industry. Wood pulp and newsprint are the leading exports.

Estonia, Latvia, Lithuania

Estonia lies south of the Gulf of Finland. The climate is one of extremes. Much of the original forest has been used but timber and wood pulp are still the chief money crops. Three-quarters of the country is either cultivated or in pasture. Rye, oats, barley, and potatoes are grown, and the farmers depend upon animal husbandry for their living.

Tallinn or Reval is the chief port of Estonia. In ordinary winters the harbour may be blocked with ice for a few days at a time. Leningrad, at the head of the Gulf, however, is frozen in for five months of the year. Tallinn acts as an import-export centre for north-west Russia during winter months.

Latvia embraces the land around the Gulf of Riga, and controls the mouth of the western Dvina with Riga as its principal seaport. Riga has the shortest rail route from the Baltic to Moscow and handles a large amount of the trade of central Russia. However, Riga being in a shallow gulf is often frozen in for at least two months. Ventspils, an ice-free port, is gaining a good share of the Russian trade. Liépaja, the old Russian naval base, is another ice-free port, but the railways running inland from it are of standard gauge and do not link with the Russian broad-gauge system. The crops grown in Latvia are the same as those of Estonia. Flax and timber are the chief exports.

Lithuania occupies the land between Latvia and Poland. The climate and the soil are similar to those of its eastern neighbour. The best land has been cleared and there is a little dairy produce for export. Timber and flax are also sold. Klaipeda (Memel) is the chief port and Kaunas the capital and largest city. Cotton and linen goods are made in the factories of Jelgava, Liépaja, and Riga.

These states were formed on ethnical grounds after the first World

War. The Ests are a people allied to the Finns. The Letts and Lithuanians belong to an old Baltic race and in this respect have a different racial origin from either the Russians or the Poles.

As a result of the second World War, these states are at the present time incorporated as part of the U.S.S.R.

Poland

Poland is a child of the first World War. The Poles are of Slavic origin similar to the Russians but more closely allied to the people of western Europe in customs and ideals. Between 1772 and 1795 the Polish Commonwealth of that day was forcibly divided among the strong states of Prussia, Russia, and Austria. Every effort was made by the several powers concerned in the partition to destroy the Polish language and spirit, but in vain. Not only did the Poles hold to their dream of an independent Poland, but their numbers increased from 6,000,000 in 1800 to over 26,000,000 in 1918. Oppression of one nation by another has never accomplished any useful purpose; the history of dismembered Poland during the last hundred years is an example. The Treaty of Versailles in June of 1919 recognized the independence of Poland and re-established its border on a national basis. The new state was larger than the old in area, and had a population of 32,150,000. What the new peace treaty for the second World War will decide is still undetermined.

Poland occupies the valley of the Vistula River and spreads westwards to the watershed of the Oder, eastwards to the Pripet marshes and the headwaters of streams flowing to the Black Sea. It has no natural boundaries except on the south where the Carpathians separate it from Czechoslovakia. The valley of the Vistula is merely another of the streams which drain northwards across the northern European plain to the Baltic or North seas. Poland may be considered a buffer state between Germany and Russia, just as the Netherlands and Belgium are buffer states between France and Germany.

The plain of the Vistula is a fertile lowland. The climate is continental, the rivers freezing over for several months during the winter. The dampness of the soil in the spring, and fall rains, make much of the land unsuitable for wheat, but rye, oats, barley, potatoes, sugar-beets, and flax are grown on a large scale.

The production of rye on the sandy soils of the lower Vistula is so great that Poland may be termed the black-bread country of the northern plain. Sugar-beets are grown in the district south of

Warsaw and on the plateau near Cracow. Potatoes also form a daily portion of the Polish peasant's diet. The production is over one ton a head of the population. The surplus is used in factories where starch, alcohol, and potato flakes are made. The flakes are used for cattle food. More beet-sugar is produced than the people care to eat and there is a large export of this commodity.

Dairying and stock-raising are important industries. Poland has 6,500,000 cattle, 5,900,000 pigs, and 1,700,000 sheep. Although these figures show a considerable reduction in the animal population as a result of the second World War, there are, at the present, indications of recovery. Despite this reduction, we can see from these figures the considerable importance of the animal industry and account for the export of dairy products.

About one-quarter of Poland is under forest. Timber is floated down to the Vistula and exported through Danzig. Some pulp and paper are made but more is imported.



Courtesy Eastfoto Agency, New York

The manufacture of light bulbs by members of a Polish youth brigade.

Manufactures.—Coal-beds are located in the south-western part of the country in the Silesian district. A part of the coal-measures extend into Germany and into Czechoslovakia. Poland has the larger portion of the field. The Silesian coal-beds were developed by Germany and were a heavy loss to that country when Poland was re-established in 1918. Katowice is the chief coal-mining centre and Cracow the manufacturing centre. The latter is an old Polish capital, situated at a point where the main trade route along the base of the mountains crosses the road through the Moravian gate to the Danube. Important deposits of zinc are found in the

neighbouring mountains and Poland is now one of the leading European producers of this metal. Iron ore is mined to the extent of 500,000 tons per year, but an equal amount is imported by way of the Vistula.

Lemberg, on the eastern plateau, near the upper Dniester, is a trading centre for south-east Poland. A valuable potash deposit is worked in the vicinity. The salt-mines at the base of the Carpathians are said to be inexhaustible. There are also oil-wells, and a production of 128,000 tons of crude petroleum per annum makes it possible for Poland to export kerosene and other petroleum products.

Lodz is the chief industrial centre of Poland. It is situated to the north of the coal-field, and in the heart of a rich farming area. Cotton and woollen goods are manufactured on a large scale. Other industries include brewing and distilling, the manufacture of jute and flax, and flour-milling. Posen in the west, and Vilna (Wilno) in the east, are important railway centres.

Warsaw, the capital of Poland, stands at a natural bridge-head on the left bank of the Vistula. It is chiefly concerned in the distribution of goods, which its position as the chief railway centre of the state ensures. The main east-west line from Berlin to Moscow crosses the Vistula at this point. Warsaw has textile factories, machine works, boot and shoe factories, and lumber mills. These, together with the governing activities of a capital city, make Warsaw a busy place. Most of the city was destroyed in the first days of the last war. Rebuilding has been a painful and slow process, but there has been remarkable recovery, and Warsaw is once more a vital city.

The Polish Corridor.—When the peace treaty of 1919 defined the boundaries of Poland, it was necessary to arrange for an outlet to the sea. In doing this a portion of territory inhabited by German-speaking people, East Prussia, was cut off from the parent country and a narrow strip of land along the Vistula was defined as a corridor to the sea. Danzig, at the mouth of the river, was made a free city under protection of the League of Nations. The majority of its citizens are Germans. Danzig handled about one-third of the Polish trade.

Since that time, and in order to have a port under her own control, Poland built a seaport at Gdynia, thirty miles to the north of Danzig. The new port cut into the trade of the old city at the river's mouth. The corridor was not looked upon with favour by

the people of Germany, and the quarrel over this area was the immediate cause of the second World War. On September 1, 1939, the Germans crossed the western Polish frontier, and just over two weeks later the Russians invaded Poland from the east. Confronted with overwhelming odds, the Polish defence collapsed. On September 22, Germany and Russia partitioned Poland by agreement, each country taking large areas of Polish territory. After the war, by the terms agreed upon at the Potsdam Conference in July, 1945, Poland received part of the German Eastern provinces, to compensate for the eastern part of Poland which had been ceded to the U.S.S.R. However, until the conclusion of a general peace treaty, to which all parties agree, the Polish boundaries will not become definite.

A very important part of the area given to Poland is **Silesia,** in the upper basin of the Oder. Not only does this region contain very rich agricultural lands, which before the war supplied Germany with cereals, cattle, poultry, eggs, vegetables and fruit, but it also has mineral deposits of prime importance. The great Silesian coal-field now lies almost entirely in Poland.

Germany

General.—At the end of the second World War, Germany was divided into occupation zones, roughly corresponding to the areas held by each of the allies—Britain, France, the U.S.S.R. and the United States. At the Potsdam Conference, the lines of demarcation of the four zones were made definite, and Berlin was created a fifth zone, divided into occupational areas among the four powers.

Germany occupies that portion of the northern European plain which lies between the basin of the Rhine and the basin of the Vistula. Southern Germany is mountainous and extends, in part, to the foothills of the Alps. This section is drained by the Danube to the east. Elsewhere, the land drops down to the plain which borders the North and Baltic seas. Four main rivers find their way across the plain to the sea. German life and industry are peculiarly bound up in these four river basins. We shall begin our discussion of Germany with a description of the chief of these, the Rhine.

The Rhine Valley.—This is the great highway from the North Sea to Switzerland, to the upper Danube basin, and through the Burgundian gate to the Rhône and the Mediterranean. Possession of this river valley has been a prize to be won ever since the



Courtesy Photokino-Verlag, Berlin

THE RHINE VALLEY

barbarians swept over the Roman frontier. At present the Netherlands hold the mouth of the Rhine; Germany controls it from the Netherland border to within a few miles of Strasbourg. From that point to Basle the river forms the boundary between France and Germany; from Basle to Lake Constance it is the boundary between Switzerland and Germany. The Rhine is an international river with four countries very much interested in its trade and development.

The Rhine source is in the glaciers of Mont St. Gotthard within a few miles of the head streams of the Rhône. Lake Constance acts as a filter and regulating reservoir for the upper Rhine. Between Lake Constance and Basle it receives many tributary streams, some of which have lake sources. The fact that the Rhine is fed by the melting snows and from lake sources is important. The flow of water in the main stream, below Basle, is remarkably even. High-water in the spring lasts about a week, while the low-water stage in the fall is seldom longer than two weeks. The even flow during the larger part of the year has made it possible to dredge the channel and to construct canals and wharves along its banks. No river in Europe has had so much time and labour spent upon its development. It is now the most travelled highway of the continent. Large river barges can ascend to Strasbourg and

ocean vessels of 2,000 tons can reach Mannheim during any time of the year. The improvement of the Rhine is due very largely to the skill and the persistence of the German people.

From the source of the Rhine to Basle, the falling waters of the main and tributary streams are used by the Swiss for the production of electrical energy. From Basle to Mainz, a distance of 200 miles, the river flows through a well-marked rift valley, twenty miles wide, and with almost perpendicular walls. The land on either side slopes gently away from the top of the rift. These slopes are known as the Vosges Mountains on the west and as the Black Forest on the east. Parts of the floor of the rift valley are covered with river silt and wind-blown soil which forms a rich loess as in the Hwang valley of China.

The southern slopes of the hills have been terraced, and the growing of grapes for wine is a common industry throughout the whole valley. On the fertile soils of the valley floor, sugar-beets, hops, barley, oats, and vegetables are grown. Some parts of the rift are among the most productive in Europe. The Black Forest plateau is largely a state forest preserve. Trees have been planted under Government supervision; regulations are strict as to cutting down of mature trees and further planting. Here and there villages are found in some fertile pocket of land. These are connected by roads cut through the forest. Lumbering is the major industry of the plateau. Many of the villagers use their spare time in making articles such as cuckoo clocks or mouth organs.

Cities of the rift valley.—Mannheim is located at the junction of the Neckar and the Rhine. The Neckar is the first large tributary below Basle. The city is one of the important Rhine ports and is a busy industrial centre. The location is convenient for the assembly of raw materials. There are factories for making glassware, agricultural machinery, and textiles. The Neckar valley is fertile and is densely populated. There are a number of small towns, each with its factory or two run by electricity. Heidelberg is an old university town. Stuttgart, capital of Württemberg, is the chief industrial centre of the valley. It has cotton factories, and is noted for the manufacture of mechanical precision instruments. All of these require considerable technicall skill. Their value lies in the workmanship rather than in the raw material. The city is the centre of the printing and publishing trades. On the farms large quantities of dairy products and vegetables are produced and the cost of living is low. The Paris-Vienna express runs through the Neckar valley on its

way to the Danube basin. This gives both Mannheim and Stuttgart an excellent position for the export of finished articles to France on the one hand and to Austria on the other.

The Rhine gorge.—Below Mainz, from Bingen to Bonn, the Rhine has cut its way through a block of old, hard rocks. This is the famous Rhine gorge. In places the banks of the river are so narrow that it is difficult to find room for both railway and roadway.

The Main River flows in from the east at the northern end of the rift valley and drains a large part of the plateau known as the Bavarian uplands, which lie between the Black Forest and the Bohemian Forest. The upland is forested with hill pastures here and there, upon which sheep are grazed. A few areas of fertile soil produce wheat, oats, and barley. The valley of the Main, like that of the Neckar, is the really fertile part of the plateau and supports a dense population. Nuremberg, on a tributary of the upper Main, has long been a centre of importance. The valley of the Main is an old trade route from the Danube to the Rhine. The road from Berlin and Leipzig passes through Nuremberg on its way to Munich and the Lombard plain. The city was the great railway centre of southern Germany. Factories were located at the point where the meeting of the trade routes ensured the assembly of raw materials and the distribution of the finished article. Nuremberg was the 'toy capital'. The industry began as a spare-time occupation of the people living in the forested uplands, but the demand was so great that eventually the toys were made in large factories. Nor was the toy-making restricted to wooden toys. It expanded until every kind of metal toy was also made. Other manufactures included electrical apparatus, glassware, pencils, clocks, surgical and musical instruments.

Because of its industries and strategic location, Nuremberg was very badly damaged by bombing during the second World War. The ancient city walls and moat, the finest medieval relics in all Germany, were all but obliterated. The industries of Nuremberg suffered severely during the war, as did the whole of German industry.

Frankfurt, on the lower Main, is still, in spite of the disruption of war, one of the largest commercial, banking, and industrial centres in southern Germany. It is situated in the midst of a fertile valley near the lower end of the rift valley. Trade routes from Hanover, Dresden, Vienna, the Saar, and from Cologne meet at this point. Some of the important industries are the manufacture



Courtesy Staudt & Co., Export-Import, Hamburg.

FRANKFURT ON THE MAIN.

of chemicals, and the making of machinery. It is the site of a very important annual Trade Fair. After the second World War, Frankfurt became headquarters of the combined British and American zones of occupation, and of Western Germany's civil administration.

Mainz, at the junction of the Main and the Rhine, would appear to have a better position than Frankfurt, but the river traffic passes it by and the railway facilities of Frankfurt caused that city to out-distance its rival at the mouth of the river.

Below Mainz two tributaries, the Moselle and the Lahn, cut their way through the old block mountains, and divide them into four parts, the Hunsrück and the Ardennes on the west, the Taunus and the Westerwald on the east. The top of the plateau is a barren moorland, with poor pasture and patches of forest. Iron ore is mined in the valley of the Sieg, where that stream has exposed a deposit. The Lahn valley is smaller than those of the Neckar and Main and is of less commercial importance. The Moselle is winding and narrow, which hinders its use as a through traffic route to the Paris basin. The culture of the vine is the outstanding phase of agriculture in the valleys of the Moselle, the Rhine gorge, and the lower Lahn. The sloping hill-sides are terraced, especially those with a southern exposure. Here we also see many a gaunt and ruined castle, sad reminders of feudal days and robber barons.

The lower Rhine.—Below Bonn the Rhine enters the wide plain, which slopes gently to the sea. Here the Romans maintained a fortified settlement or 'colonia', from which comes the name

Cologne. Like so many other German cities, Cologne was severely damaged by bombing during the second World War. The east-west trade route along the base of the plateau crosses the Rhine at this point and it may be considered the head of navigation for large ocean-going vessels. The fertile plain on either hand is densely populated, coal is close at hand, and Cologne has become an industrial centre and one of the chief Rhine ports. The industries are chiefly concerned with the manufacture of luxuries such as perfume, tobacco, and chocolate. There are also important glass, chemical, and textile works.

The Ruhr Valley.—The Ruhr and the Lippe are the chief eastern tributaries of this section of the Rhine. Their importance is out of all proportion to their length or size. The fact is that both rivers cut through the best and largest coal-field in western Europe. These coal-measures are really a continuation of the Belgian field and the coal mined before the war amounted to over 100,000,000 tons annually.

This is the 'black country' of Germany. Blast furnaces are almost continuous between Düsseldorf, Duisburg, and Dortmund. Up the Ruhr to Essen similar conditions prevail. Essen is the centre of the Krupp armament factories, which after the first World War manufactured locomotives, rails, and machinery of many kinds. After 1933, the war industries of this district were re-established, at first secretly. During the second World War, the area was therefore an important target for allied bombers. The iron ore was brought from Lorraine, Luxembourg, and Sweden. Pig iron came down river from Sieg. The deepening of the Rhine has made it possible for quite large ocean steamers to ascend the river to Duisburg with the result that the Ruhr coal-field occupies a position in world trade almost equal to that of South Wales or Yorkshire. In fact, its nearness to large bodies of iron ore gives the Ruhr an advantage.

After the second World War, the Ruhr valley lay within the British zone of occupation. It was determined to dismantle its industries to prevent the future manufacture of armaments, but coal production was encouraged.

Near the coal-mines and the steel-works we find the largest textile factories in Germany. Cotton and woollen goods, silks, velvet, linen, plush, as well as ribbons and laces, are made there. Chemicals and dyes are produced on a very large scale and distributed to the textile towns.

The Aachen coal-field on the Belgian border, an extension of the Meuse coal-field, has iron and steel industries. Lignite is mined from the hills behind Bonn and used in the production of electrical energy for the textile factories and steel-works on the Ruhr. The Ruhr-Rhine section of western Germany is the most highly industrialized portion of the country.

Marginal industries of the north German plain.—If we follow the margin of the plain eastwards we shall find a number of industrial centres which have grown up at favourable locations close to the base of the southern uplands. The Harz Mountains lie east of the Westerwald and the valley of the Weser. An inland sea once washed the base of the mountains, but the climate changed, the sea drained away, leaving beds of salt below and potassium salts above. The presence of these beds has proved to be a great boon to the German people. The potash is made into a chemical fertilizer and used to enrich the sandy and somewhat barren soils of the plain. Some of this fertilizer is exported. The common rock-salt is the basis of a large chemical industry.

At the base of the Erzgebirge, or Ore Mountains, we find the well-organized district of Saxony. These mountains were once the principal European source for silver, zinc, tin, and iron. But over the last hundred and fifty years, the output from the mines decreased and led to much unemployment. The people then turned their attention to the making of things which required skill, but a small amount of raw material. In the mountain valleys of Saxony there are many people who make clocks and toys from the wood of the forested hill-sides. Lace-making is another cottage industry and gives some villagers their livelihood.

Leipzig lies in a fertile vale between the Saale and Elbe valleys and at a moderate distance from the industries of the Harz and the Erzgebirge. Many routes meet at this point. We may go from Hamburg and Berlin via Leipzig to Dresden and Vienna; or south-west to Frankfurt, or south to Nuremberg. For this reason the city is noted for its fairs and open markets. Through many centuries Leipzig has developed as a great fur centre. Here are the skilled workmen who buy raw fur and process it so that it may adorn 'my lady's cloak'. In 1409 a university was established at Leipzig and the city became a noted library centre. This led to the making of books, with the result that today Leipzig is one of the great manufacturing centres for books and magazines. A century ago many of the books were bound in leather, and Leipzig

still has a large trade in the tanning of hides and the making of leather goods of all kinds.

Dresden is on the Elbe below the gorge where the river breaks through the Erzgebirge. It commands the route from the plain to the centre of the Bohemian block which now belongs to Czechoslovakia. This city is the capital of Saxony and is noted for the beauty of its surroundings as well as for the chinaware and porcelain made in the vicinity. A small coal-field is a further factor of importance. Gold and silver articles of fine workmanship, perfumes, lace, and musical instruments are also made. Both Leipzig and Dresden were severely damaged during the second World War, and at present are engaged in a programme of reconstruction.

The Bavarian uplands stretch from the Black Forest to the Bohemian Forest. This section of south-western Germany is a rough plateau over 2,000 feet above sea-level. Wheat, rye, oats, barley, and potatoes are grown on the better soils. Munich, on the Isar, a tributary of the Danube, is the administrative centre of Bavaria. It is noted for its beer, art treasures, and library. Optical instruments are made in large quantities.

The north German plain extends from the Rhine to the Oder. It is largely an agricultural area, of about 80,000 square miles. There are wide variations in the soil, some parts being fertile while other sections are sandy moorlands and bog. As the ice-sheet retreated long ridges of gravel and sand were piled up. These ridges extend in a long line from Poland to Holland. The Weser, Elbe, Oder, and Vistula have all cut river gaps through the sand ridges.

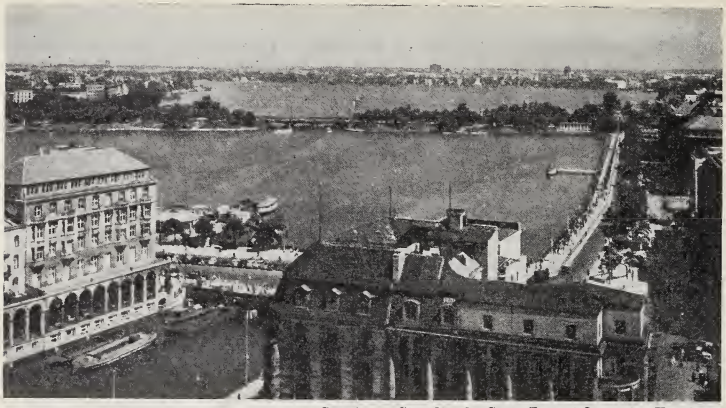
The river valleys provide the best agricultural land, while the divides between the streams are generally sandy. The chief crops of the plain are rye, oats, and potatoes. Rye is a cereal which will grow on poor, cold, sandy soil, and produce a crop where wheat would fail. Potatoes and oats may also be grown under similar conditions. Wheat is a particular plant and requires fertile soil and good drainage. The climate of the German plain is much colder than that of France; the winters are longer, the rivers freeze over, the land is covered with snow. Spring comes late and, farther east, the influence of west winds from the Atlantic is lost. The summers are not as hot as in France and there is much showery weather. Fall frosts come earlier and the fall rains soon soak the soil and fill the streams and ditches. These conditions are not favourable for growing wheat.

Two outstanding sections of the plain must be mentioned—the Silesian trough and the Saxony triangle. These fertile plains which stretch out from the base of the mountains are drained by the Oder and the Elbe rivers. The soil is a fertile clay-loam deposited at a time when the ice-sheet had retreated. In these plains sugar-beet and wheat are grown. Magdeburg on the Elbe and Frankfurt on the Oder are sugar-refining centres. The sugar-beet industry has grown to such a size that Germany is able to supply her own wants and export some sugar to other countries. The refuse of the beet factories is fed to cattle, a decided help in the production of milk.

The Baltic coast of Germany is low, bordered by long *haffs*, or sandspits, which stretch eastwards from the headlands. The Baltic Sea is not safe during the winter months and during a severe winter may freeze for a distance of many miles from the shore. Kiel owes its importance to its position at the eastern entrance of the Kiel Canal. The canal has never become the main trade route which its builders predicted; vessels continue to sail by the Skagerrak and Kattegat rather than pay toll through the canal.

The North Sea coast of Germany is far more important than is the Baltic coast. The North Sea does not freeze and the Elbe River valley extends through the heart of Germany. Canals connect the Elbe with the Oder and Vistula on the east, with the Weser and the Rhine on the west. Barges of 1,000 tons capacity may now go from Hamburg to Warsaw and it is planned to connect the canal system with the Danube. The canal system, of which the Elbe is the centre, has done more than the climate in lowering the value of the Baltic ports.

Hamburg is the great port of Germany, although as a result of war damage, the capacity of the port in 1946 was only 25% of its peacetime standard. It is located on the Elbe, sixty miles from the sea, at a natural bridgehead where sandy hills come down to the river banks. Below this point the land was once a wet, soggy marsh. Above it a number of islands divide the river into shallow channels. Hamburg is at the limit of ocean navigation on the Elbe. The Kiel Canal runs from the Elbe estuary to the Baltic, and this is a convenient route from the city to the east. Another canal, the Elbe-Trave, runs to Lübeck and drains away much of the trade which that old seaport once enjoyed. Before the second World War, large quantities of cotton and wool were landed at Hamburg. Much of this was distributed to the inland textile



Courtesy Staudt & Co., Export-Import, Hamburg

THE PORT OF HAMBURG.

centres of Saxony. The city itself had many and varied industries based on the ease with which raw materials could be secured. Hamburg was also one of the great emigrant ports. Ships sailed directly to the Americas and thousands of people from central Europe came to Hamburg for passage to other lands. Cuxhaven is the outport of Hamburg, at the mouth of the river. There is a steamer connection with England.

Bremen, on the Weser, with its outport Bremerhaven, resembles Hamburg on the Elbe. However, the Weser does not drain as large a territory as does the Elbe, and the city suffers from competition with Rotterdam and the great Rhine trade route. Bremen rivaled Hamburg as an emigrant port for those desiring to make their homes in the Americas. It was also noted for its large cotton imports, which go chiefly to Chemnitz in Saxony. Chemnitz is the Manchester of Germany.

Berlin, the capital of Germany, is centrally located for the purpose of government. It is situated on the Spree, a tributary of the Elbe. The surrounding country is sandy and much of it is poor soil. The position of the capital in relation to the main trade routes was, however, a strong factor in the rapid growth of the city during the last hundred years. The railway system of Germany was built from Berlin as a centre and there is no city in Germany which approaches it in this respect. The capital has been kept in mind during the canalization of the streams from the Rhine to the Vistula, and Berlin is, therefore, the heart of the main transportation systems of Germany.

The position of Berlin on a tributary of the important Elbe system makes it an easy matter to import raw products from Hamburg; Lübeck is not far away and Stettin may almost be considered an outport for the capital on the Baltic. By 1939, the industries of Berlin were almost as varied as those of London. There were large clothing factories and plants which made machinery and tools. These were the two leading industries and gave employment to over 200,000 artisans. There were also many printing establishments, book-binderies, rubber and leather goods factories, and many others. Berlin had no rival on the continent except Paris. Its growth during the last century kept pace with the development of industrial Germany. Because of the terrible damage done to the city during the second World War, when about 75% of the city was destroyed, there are many sections of the city which must be completely rebuilt.

The Netherlands

This country is a low, hollow land, hence the name Holland. Here a part of the northern plain has sunk below the sea, and man has built his dykes and canals and has drained the land that he may live on the rich polders which he has reclaimed. As the Nile delta tells of the toil of millions of peasants, so do the fertile fields of Holland tell of the labour of millions of Dutch farmers.

The kingdom of the Netherlands is a little larger than Belgium. The population, 9,800,000, is a little greater than that of its western neighbour. About 53% of the people live on the land or may be classed as rural.

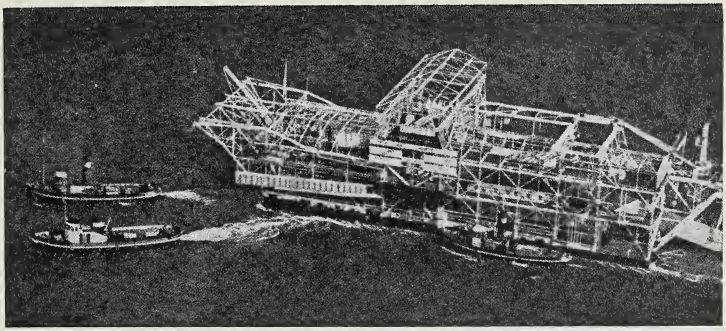
The surface of the country may be divided into three parts: sand dunes along the coast, rich polders behind the dunes, and gently sloping sandy moorlands in the south and east. The dykes are built on the sand dunes, and tough grasses have been planted on them to keep the sands in place. Dykes also enclose islands which lie between the mouths of the Schelde and Rhine. Once the land has been enclosed or dyked, the surface water is pumped out, drainage ditches are dug, and pumping is continued until the water-table is below the surface of the soil. The main drainage canals are opened at low tide and the water is allowed to escape. In this manner the land is made fit for cultivation. However, some of the polders are so low and damp that the land is kept in perpetual grass and dairying is the only industry. This condition obtains in parts of Holland and Friesland. During the last century over 400 square miles of land have been reclaimed from the sea.

In 1918 plans were made for draining an even larger area situated in the Zuider Zee. This ambitious project reclaims 815 square miles, or over 520,000 acres. Work was begun in 1924, and was completed before the second World War, at a total outlay of $250,000,000. This shows that land in Holland is a very precious article. If southern Canada had a population density of nearly 700 to the square mile we might think so, too.

Dairying is the chief industry of the dykelands. Large quantities of cheese, condensed milk, and butter are produced. The round Dutch cheeses are made in the district around Edam and Alkmaar. Bulbs are grown in the Leyden-Haarlem district, west of Amsterdam. Here on the edge of the dunes, where the sand and the clay can be mixed, there is a belt of well-drained, porous soil, and bulb culture has attained a position second to none in the world. Between Haarlem and Alkmaar, in a similar soil formation, there is a belt devoted to market gardening. Early potatoes, cauliflower, cabbage, and strawberries are grown for the city markets. South of The Hague there are many greenhouses where early vegetables are grown.

South of the dyked lands we find a better drained, heavy clay soil. Here the farmers grow sugar-beet, wheat, oats, barley, and potatoes. About two-thirds of the area of the Netherlands is arable land. East of the clay and silt lands there is a belt of sandy soil similar to that of the Campine in Belgium. It is composed of sands and gravels left from the ice-sheet which once covered northern Europe. This district has large stretches of moorland, worthless heaths, and bogs. Where the industry of the peasant has made it possible to make a living, rye is grown. This part of the country is thinly peopled. During recent years, however, a concealed coalfield has been opened in the moors near the Belgian border. The seams lie 300-500 feet down, in water-logged soil, and the coal is not of the best quality, but is a decided asset, nevertheless.

Trade and commerce.—The kingdom of the Netherlands controls the mouth of the Rhine. This accounts for the large trade which the country maintains. The Rhine is the best highway into western Germany, eastern France, and Switzerland. In normal times, most of the products of the highly industrialized Rhine basin find their way to world markets, via the Rhine and the great Dutch seaport of Rotterdam. In a similar manner raw products are brought to Rotterdam from many distant lands and are distributed up the Meuse or the Rhine as trade demands. Although much of this is transit trade it gives employment to many people, and in 1939,



Courtesy Netherlands Government

Dutch towage services encircle the globe. Here is a tin-dredger on its way to Indonesia.

Holland had a merchant fleet of over 3,000,000 tons. Rotterdam now rivals Hamburg as the largest port on the mainland of Europe. It ranks next to London in the amount of ocean and river tonnage handled in a single year. Rotterdam has developed industries due to the very large amount and variety of raw materials which are landed on the docks. It is a shipbuilding centre, and has large engineering works and important flour mills. Because the land is so low, dry air raid shelters were almost impossible to construct in the city, and as a result the casualities in Rotterdam during the last war were staggering.

Amsterdam is the second port of the Netherlands, and the chief city of the country. As ships increased in size during the nineteenth century it became impossible for them to use the Zuider Zee, and Amsterdam lost some of its trade. Then Dutch engineers built a deep ship canal to Helder, and later, the North Sea Canal running west to Ijmuiden. Now the largest ocean vessels can come to Amsterdam. Many of the streets of Amsterdam are canals with a narrow roadway along the side. The houses are built on piles driven deep into the sand. The city enjoys a large trade with the former Dutch colonies in the Indies. Spices, rubber, tea, coffee, raw sugar, cacao, rice, and copra are among its noted imports. These products are manufactured or put into packages and re-exported in a form ready for use. Amsterdam is also noted as being the principal diamond-cutting centre of the world.

The Hague is the political and administrative centre. The city is noted for its large public buildings and stately homes. It is a residential city.

Flushing and Hook of Holland are packet stations. There is a regular fast steamer service with Harwich and London. Vegetables and dairy products are exported to England from these ports and from Ijmuiden.

Fishing is one of the industries of the Dutch people who live near the sea. The three ports mentioned above are centres of the fishing-fleets. The catch is similar to that of the English fishermen who live along the eastern coast of the island.

Manufactures.—As already noted, the chief manufactures of Amsterdam and Rotterdam are tied to the import of materials which come largely from the East Indies. Since the Netherlands have no minerals, the iron and steel trades are of little moment. The manufacture of textiles is also on a small scale. Haarlem makes the cloth known as brown holland from flax grown in the neighbourhood. Utrecht and Tilburg manufacture linen. Where the clays are suitable, as at Delft, chinaware and pottery are made. Some cotton and woollen goods are manufactured at Amsterdam, Maastricht, and Utrecht. The kingdom of the Netherlands relies more upon its agriculture than does Belgium, and more upon trade and commerce with its valuable colonies and with the rest of the world.

Belgium

Belgium lies west of the Netherlands and controls the mouth of the Schelde. The boundary between France and Belgium is an artificial line. It does not follow any natural feature, but cuts across river, valley, and plain, extending from the Ardennes to the sea between Dunkirk and Ostend. The Lys and the Schelde drain northern Belgium eastwards into a long estuary of the North Sea. The Sambre and the Meuse drain southern Belgium eastwards to the Rhine.

The coast is bordered by a ridge of sand dunes thrown up by the waves of the North Sea. Behind the dunes are the low rich 'polders'. South of the polders is a clay belt overlaid with a thin layer of sand. The Belgian farmers have dug the sand into the clay, and this part is now a fertile, productive area. South of the Meuse the land rises to the rocky plateau of the Ardennes. The lower slopes are fertile, but the plateau land is covered with forest and poor pasture. Eastern Belgium, the Campine country, is poor sandy soil which even the industrious Belgian peasant has found impossible to utilize.

The polders produce fine crops of grass, barley, and sugar-beet.

Dairy farming is the important industry. The sand-clay belt, part of the old plain of Flanders, is cut into small holdings of a few acres each. The farmers work every foot of the ground, and by the use of the underlying clays and of manures, large crops of rye, flax, potatoes, and vegetables are secured. The Hesbaye loams to the south produce wheat, oats, and large quantities of sugar-beet. Here the farms are of larger size. There is much market gardening around Brussels. Dairying is important, as the cattle and pigs are fed on the waste pulp from the beet factories. The vine is grown in the valley of the Meuse, and south of that river there is another dairying region.

With an area of only 11,752 square miles, Belgium has a population density of 690 per square mile. It will be seen that every acre of fertile land is valuable for the production of food for the teeming population.

Manufacturing.—Belgium may be a small country in area but it is a giant in the realm of trade and business. This is partly due, as in England, to large deposits of coal. Mines are located in the Meuse valley along the line of Liége-Namur-Charleroi-Mons. Iron is mined in the Ardennes, although the iron deposits are nearly exhausted, and more is imported from Luxembourg and Lorraine. The iron comes to the coal, and so the valley of the



Courtesy Wheeler Newspaper Syndicate

ST. HUBERT GALLERIES, BRUSSELS.

One of the famous covered galleries of Belgium.

Meuse rumbles with the clang and roar of blast furnaces and steel works. Thousands of men are employed in this industry, which constitutes the backbone of Belgian manufacturing.

Liége and Charleroi are centres of the steel industry. Firearms, ordnance, all kinds of machinery, automobiles, and locomotives are some of the articles which are made in and around these hives of industry. Zinc, copper, and tin ores are brought to Liége by way of the Rhine-Meuse waterway. The zinc-sulphide ores give sulphuric acid, and this is the basis of large chemical works. The copper comes mainly from the Belgian Congo. Belgium has long been noted for the manufacture of glass. The coal mined at Charleroi is peculiarly suitable for use in glass furnaces and the industry is located at that point. Sand is brought from the Campine and from Fontainebleau in France.

Textile factories are found in many Belgian cities. Centuries ago the cities of this northern plain excelled in weaving woollen cloth. At that time the people of England exported their raw wool to the great cloth towns of Ypres, Calais, Bruges, and Ghent. Raw wool was then England's chief export. But times have changed, the English have learned to manufacture their own wool and wool from other countries. The skill and industry of the Belgian weavers, however, have been handed down from father to son, and these old medieval cities still engage in their ancient trade. Verviers, east of Liége, is the chief centre of woollen manufacture. There is a small amount of local wool from the pastures of the Ardennes, but thousands of tons of wool are imported from abroad. It is washed and scoured at Verviers because the water of the streams flowing down from the Ardennes has been found to be peculiarly suited for this purpose. Verviers sells large quantities of scoured wool to other places.

Linen is manufactured in the Flanders district, where flax is grown and where the water of the River Lys is known to be suitable for retting it. Courtrai, Ghent, and Tournai are noted linen towns. The local supply of flax is not equal to the demands of the factories and fine linen yarns are imported from Ireland. Ghent is also the centre for the weaving of cotton, which is brought in by way of the canal.

Antwerp on the Schelde, fifty miles from the sea, is the chief port of Belgium. Here are gathered the hundred and one manufactured articles of the country: iron and steel goods of the Meuse valley, textiles from the linen, wool, and cotton towns, and some iron and potash from Lorraine and Alsace. Here, great

ships land their cargoes of cotton, wool, copper, and zinc, oil seeds, lumber, and grain, part of which is intended for eastern France and western Germany. The reason for this is that Antwerp is connected by means of a barge canal with the Rhine on the one hand, and with the canal system of north-eastern France on the other.

Brussels, the capital of Belgium, has an excellent, central location. It is midway between the textile centre of the north and the iron and steel district of the south. It is connected with Antwerp by a barge canal which can accommodate vessels of 2,000 tons. Brussels is the business and administrative centre of the kingdom and contains many fine parks and buildings. It has numerous small industries which require fine workmanship, such as the making of clothing, jewellery, lace, carpets, and luxury articles of many kinds.

Ghent may be called the 'Manchester of Belgium'. The city stands at the confluence of the Lys and the Schelde and is admirably placed to transact business up or down stream. A barge canal runs through the lowland direct to the Schelde estuary, and it is by this means that raw cotton is brought up to the city. Ghent is also connected by canal with Bruges, Ostend, and Zeebrugge. Bruges was a seaport of considerable importance six hundred years ago; then the city had three times its present population and was the chief cloth town of Flanders. But waves and tidal currents brought sands down the coast from the Rhine mouth, and the estuary of the little river Zwin was gradually silted up. Ostend is the chief packet-boat town, with regular passenger service to Dover, and an export of vegetables and dairy products from the polder farms which lie to the south.

France

France has nearly twice the area of the British Isles, but the population is several millions less. In any discussion or comparison of the two countries this fact must be taken into account. A number of reasons will appear as we examine the country which lies to the south of the English Channel.

France occupies a strategic position in Europe. Her lands stretch from the Alps to the Atlantic, from the Channel to the Mediterranean Sea. Spain is cut off by the barrier of the Pyrenees, Germany is cut off from the Mediterranean by the Alps and Italy.



Courtesy Government of France

These sidewalk bookstalls are typical of many French cities and towns.

For these reasons France has been, for many centuries, one of the leading countries of Europe.

A relief map will show five well-marked divisions or regions. Broadly speaking, eastern France is mountainous. Its rivers, with one exception, drain westwards to the Bay of Biscay or northwards to the Channel, across a broad plain sloping to the seas, a part of the northern plain of Europe. Now let us divide these two general features into several smaller regions for purposes of study.

The central massif is the most pronounced feature of the relief. The massif consists of a block of crystalline rocks, worn and gouged by the ice and the weather of many centuries. The plateau slopes gently to the west and disappears under beds of limestone and sedimentary deposits of the Garonne basin. A fault appears along the eastern margin of the massif and there is an abrupt descent to the valley of the Rhône. From the Rhône valley the wall of the plateau appears as a mountain range and is known as the Cévennes. The northern part of the plateau has been covered with a deep volcanic out-pouring. Some of the extinct volcanoes still protrude above the general level as at Puy de Dôme, 4,850 feet. This is the Auvergne district of central France.

The soil on the plateau is poor and thin. Rye is grown and sheep are grazed. Both indicate the nature of the soil. The volcanic soils of the Auvergne, however, provide fertile valley lands which are in marked contrast to the rest of the plateau. The central massif covers one-sixth of France and is sparsely populated.

The Rhône-Saône Valley lies in a trough between the steep escarpment of the Cévennes and the Côte d'Or on the west and the Alps and Jura Mountains on the east. A large section of the Alps lies within French territory. From Lake Geneva to the sea the boundary line is about one hundred miles east of the Rhône River; Mont Blanc, 15,782 feet, is in France.

The Rhône rises in the glaciers of Mont St. Gotthard and flows through Lake Geneva, which acts as a filter. It then curves around the southern end of the Jura Range to enter the trough which leads southwards to the Mediterranean. The Saône joins the Rhône at Lyons, draining the upper part of the trough. The importance of this valley as a highway of communication between Marseilles and Paris can hardly be over-estimated. It is one of the natural features which help to make France a great and powerful country. There is also easy access to the middle Rhine valley by way of the low divide between the Jura and Vosges mountains. This pass is known as the Burgundian gate.

The valley of the Saône is noted for its vineyards, which extend far up on the warm, sunny southern slopes of the hills and out on the valley floor for a mile or more. The climate is somewhat continental, summer rains and heat, with cold dry winters. Wheat is grown and sheep and cattle are grazed on the pastures. Dijon is the important city of the Saône valley.

Lyons, at the junction with the Rhône, is noted for its silk manufactures. The industry became established centuries ago when returning crusaders first introduced silkworm culture into the district. Mulberry trees grow in the lower Rhône valley and some raw silk is produced. Electrical power generated by Alpine streams is used in many of the Lyons factories. Coal is mined from a small field at St. Etienne in the central massif. St. Etienne is also noted for the manufacture of fine silk ribbon.

Grenoble in the Isère valley is noted for the manufacture of gloves. It is said that every village within a forty-mile radius of Grenoble is engaged in glove-making. The Alpine hill-sides are suitable for pasturing sheep and goats from which the leather is secured. Rail lines run up the Isère and cross the Alps by the Mont Cenis tunnel.

Below the Isère, the Rhône valley widens into a funnel-shaped lowland, and here we find the Mediterranean district of southern France. Olive trees, vineyards, walnut groves, patches of wheat, maize, and beans, and mulberry trees near the watercourses, are seen on every hand. The summers are hot and dry. In the winter

the cold north-west mistral brings suffering to the people and harms the growing crops. Nearly all the fields have rows of cypress trees set out for wind-breaks.

Marseilles is the great seaport of southern France. It has been built east of the marshy delta of the Rhône because a current along the shore washes the silt towards the west. The city was a large port in Roman times but has profited greatly by the opening of the Suez Canal and the acquirement by France of colonies in Africa. Marseilles is an industrial centre as well as a seaport. Olive-oil from the Rhône valley and from Spain and palm-oil from Africa, are used in the manufacture of soap, candles, and margarine. Other industries include flour-milling, sugar-refining, tanning, paper-making, and shipbuilding.

Toulon lies to the eastward, on a deep, landlocked harbour. It is the chief naval station of France on the Mediterranean. Cannes and Nice are winter resorts along the French Riviera. Near the Italian border, is the tiny principality of Monaco, with the famous town of Monte Carlo. In this part the mountains slope steeply to the shore and protect the coast from the cold north-west winds of winter.

The plains to the west of the Rhône delta are devoted largely to the growing of grapes. A canal has been built from Cette through the Carcassone gate to the Garonne River.

The Garonne Valley.—South-western France slopes gently to the Bay of Biscay. The climate is mild, owing to the westerly winds which blow in from the sea. The rainfall is heaviest in winter but is well distributed through the summer months. Short, rapid streams come down from the Pyrenees and across the belt of glacial debris where sheep are grazed. A wide belt of sand dunes, the well-known 'Landes' district, stretches along the coast from Bayonne to the Garonne estuary. To stop the dunes from spreading inland over the fertile land, the Government has planted thousands of pine and cork-oak trees. Now the Landes are repaying the effort that was made, providing pit-props, turpentine, and layer cork, while sheep are grazed on its coarse grasses. It is a fine example of the reclamation of waste land.

The central Garonne valley is a rich, alluvial plain devoted to the cultivation of the grape and the growing of wheat and maize. About one-third of the total wine production of France comes from the district adjacent to Bordeaux. North of this city, in the valley of the Charente, grapes are grown from which brandy is made. Distilleries are located at Cognac.



Courtesy Touring Club of France

THE HARBOUR AT BORDEAUX.

Toulouse, on the upper Garonne, is a railway centre. Its fortress once stood guard at the western end of the Carcassone gate. Bayonne, in the far south-west, is a trading centre for the surrounding district. A railway line runs south along the coast into Spain. **Bordeaux** is the chief seaport and industrial centre of the Garonne basin. The city is located at the head of the estuary, where the river is bridged. A number of trade routes cross at this point. The main road from Spain comes in from the south, trade comes down river from the east, while several rail lines branch out to the north. Wines and brandy are exported, raw sugar is brought in from the West Indies and is refined. There are also chemical works and oil refineries.

The Loire River parallels the Garonne. It rises in the central massif, flows through the western part of the Paris basin, and reaches the sea by means of a long estuary in the flank of the Armorican massif of Brittany. Orleans is the principal city of the middle Loire. It is situated at the big bend of the river, at the point nearest Paris. Tours is at the point where main roads lead south through the Poitou gate to Bordeaux and Spain. Nantes is an old seaport of the Loire. It was once at the head of navigation for large vessels, but silting up of the channel made it necessary to build the port of St. Nazaire. This port is now the principal shipbuilding centre of France. A ship canal connects with Nantes.

The Armorican massif of Brittany is an area of granite rock which resembles the Dartmoor block in Devon, across the Channel. Between the granite ridges and barren moorlands are deep, fertile

valleys. The moors are damp, windswept, and deserted. The villages seek protection and warmth in the valleys. Even here the number and size of the stone fences show the toil of generations of people who have laboured to make their fields fit for the spade or plough. The mild winters make it possible to grow early vegetables which find a ready market in England. The sinking of the coast has allowed the sea to flood a number of valleys between the granite ridges. Fishing boats find anchorage in these protected *rias* and there is a profitable industry in canning sardines. Other Breton fishermen engage in the cod fisheries of Newfoundland and Iceland.

St. Malo is the chief port of northern Brittany. It exports butter, cheese, and early vegetables to Southampton. Brest is a naval station, the French equivalent of Plymouth. Cherbourg is also a naval station, but is better known as a port of call for transatlantic liners. Fast express trains run to Paris.

The Paris basin occupies the larger part of northern France. It lies between the central massif and the Armorican massif, and is bordered on the east by the Vosges-Ardennes highland. In many respects the Paris basin resembles the lowlands of south-eastern England. Chalk and limestone ridges slope down to fertile clay vales. Rivers wind their way across the basin and empty into estuaries which extend for some distance into the land. The lowest part of the basin is that of the middle Seine valley, the 'Ile de France'. Here the underlying chalk measures are covered with a variety of clays, marls, and sand. The sand ridges, as at Fontainebleau, are forested. However, this sand is well adapted for glass-making and is exported to Belgium and England for use in the glass works there. The clays and marls are wonderfully fertile. Truck gardening in the district around Paris is the chief occupation. Sugar-beet, wheat, oats, potatoes, and vegetables are grown on a large scale.

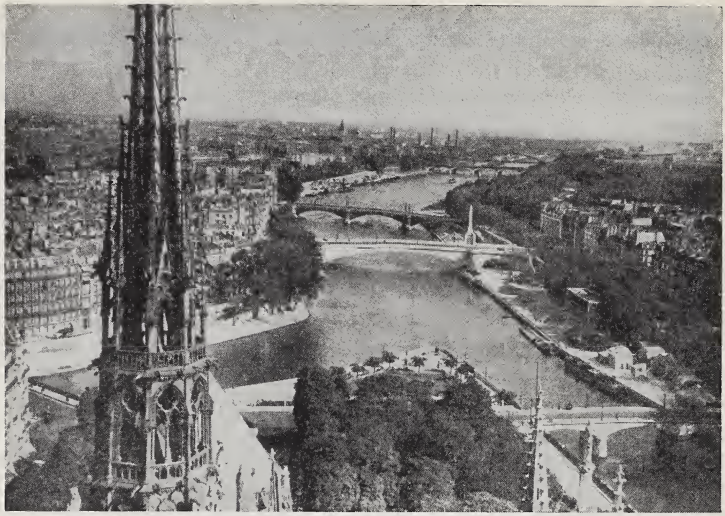
Beyond the rim of the Ile de France, chalk beds come to the surface, as in Artois. This section is known as the 'Dry Champagne' country. The rainfall seeps through the chalk, leaving the surface almost waterless. It is a sheep country. Beyond the chalk scarp is a limestone plain covered with clay soil, the 'Wet Champagne'. In this part dairying and growing of sugar-beet is carried on, as in the Brie district. The low plateau of Beauce is a limestone plain covered with a fertile loess. It lies between the Seine and Loire Rivers. This is a great wheat-growing area.

The Paris basin is the chief agricultural district of France. It produces half of the wheat, three-quarters of the oats, and practically all the beetroot grown in the country. There is dairy farming on the wet grasslands, while sheep are pastured on the dry scarps.

The Seine River and its tributaries, the Yonne and Marne, rise in the northward extension of the central massif. The valleys of these streams provide a direct, low-level route from the Côte d'Or to the channel. In the valleys of the Aisne and Marne are grown the grapes from which champagne is made. All the main tributaries of the Seine, with one exception, enter the parent stream above Paris. As a result, during a period of heavy rains, the Seine rises rapidly and sometimes floods its banks. The lower parts of the old city of Paris are subject to inundation from time to time. Below Paris the river meanders through a fertile plain to the sea. Rouen stands at the head of navigation on the lower Seine. It is next to Marseilles in importance as a port of entry for merchandise of many kinds. Raw cotton is imported and the city and surrounding district are noted for cotton manufacturing. Havre is a passenger port and imports wheat, cotton, rubber, and coffee. There are cotton mills and flour mills.

Paris, the second largest city on the continent of Europe, stands supreme in the heart of the Ile de France. Paris is even more the centre of finance, trade, and government for France than is London for England. The main rail lines radiate from Paris; so do the main canals. The city, which originally began as a fortress on an island in the Seine, now spreads far on either side of the river. Many beautiful bridges cross the river, while barges move slowly up stream from Rouen or down stream from Dijon and Troyes.

The industries of the great city are of every kind. However, the principal ones are those which require a high degree of skill in workmanship. There is no coal near Paris. The manufactured goods must be sent to some outport in order to enter world trade. And so we find jewellery, perfumery, millinery, gloves, footwear, fashionable clothing, and dress goods, even furniture and porcelain, being made in Paris factories; Paris fashions have a world-wide appeal. There are art schools, colleges, and universities. It is a great tourist centre. The floating population, those who come and go, must number hundreds of thousands. A person returning from a trip to Europe is sure to be asked the question: 'And how did you like **Paris?**'



Courtesy Wheeler Newspaper Syndicate

A view of the Seine in Paris.

North-eastern France merges into the plain of Belgium and rises to the heights of the Argonne and the Ardennes. This is the chief industrial region of France. Under the chalk beds there are seams of coal, that precious mineral which is so scarce in the rest of France. There is iron ore in the hills and some parts of the country resemble the Birmingham district of England.

The coal extends along the line of Aachen-Liége-Namur-Valenciennes to Lens in the west. Only a small part of the coal-field lies within French territory, but that part is so valuable that there is an annual output of 30,000,000 tons. Lens is the chief coal-mining centre, but mines are in operation all the way to the Belgian border. Lille is the largest city of the region. It is noted for its machine and engineering works, the pig iron coming from Lorraine. Both cotton and linen goods are manufactured at Lille, the linen being made from a fine quality flax grown in the vicinity. Raw wool is landed at Dunkirk, which is becoming the chief import centre, and is distributed to the textile towns of Roubaix, Turcoing, and Fourmies. Rheims is another wool-manufacturing centre, but draws its supply largely from local flocks. St. Quentin, Amiens, and Cambrai are cotton towns. Valenciennes and Arras not only manufacture textiles and lace, but have large plants for

the making of sugar, alcohol, glass, chemicals, and machinery. Sugar-beet factories are a common sight in the country districts.

Eastern France.—After the first World War the provinces of Alsace and Lorraine were returned to France. From Basle to Strasbourg that part of the Rhine valley lying close to the foot of the Vosges is covered with a rich soil and is densely populated. There is much truck gardening, while wheat, maize, tobacco, sugar-beet, and flax are also grown. The southern slopes of the foothills are covered with vineyards. Belfort is a fortress town guarding the Burgundian gate between the Rhine and Rhône valleys. Mulhouse, on the River Ill, a tributary of the Rhine, is a textile centre manufacturing cotton, woollen, and silk goods. To the north of the city is located one of Europe's great potash and salt deposits. Mulhouse has the largest chemical works in France. In recent years as much as 714,000 tons of potash have been mined and distributed to the farm lands of France. Strasbourg is a market centre for rich agricultural lands to the north. It is a railway centre of importance, being situated on the most direct route leading westward from the upper Rhine by way of the Lorraine gate (around the Vosges) to Paris. The Orient express from Paris uses this gate, via the Marne valley, on its way to Vienna.

Lorraine comprises the rocky plateau which slopes westwards to the Paris basin. It is drained by the Meuse and Moselle. In the valley of the latter stream, from Nancy to Longwy and Luxembourg, there is an almost continuous deposit of iron ore. The Lorraine iron-field produces more iron than any other section of Europe and ranks second in tonnage to the Mesaba range of Minnesota. Longwy, Brey, Metz, and Nancy are the chief mining centres and all four have large smelters and steel works.

The Saar River is a tributary of the Moselle. There is an important coal-field in the basin of the Saar, the production amounting to 14,000,000 tons annually. The treaty of Versailles awarded the Saar basin to France for a period of fifteen years. This was done in order to compensate France for the wanton destruction of coal mines in the Lens district. A plebiscite was taken to determine whether the people wished to remain a part of France, to be again incorporated in Germany, or to remain under the League of Nations. There was a large majority in favour of return to Germany, and in 1935 the League of Nations handed back the Saar to German sovereignty. After the second World War the area was included in the French zone of occupation in

Germany, but in 1947 a new constitution was drawn up which made the area, now known as Saarland, a separate state. In 1950, France granted Saarland self-government in return for its coal output, estimated at 15,300,000 tons annually, for fifty years.

Coal from the Saar is an integral part of the economic development of the Lorraine iron-field. Nature has been wonderfully kind to place iron ore and coal-measures so close together in this plateau of Lorraine which is so far from the sea. However, the Lorraine district is served by three river routes which admit of the transport of iron and steel products to the northern district of industrial France, to Germany, Belgium, and Holland, and southwards to Marseilles.

Luxembourg.—The Duchy of Luxembourg is a small independent state under the protection of the great powers. The capital city has grown up around an old medieval fortress which guards three important trade routes. One is the route eastwards from Paris around the southern edge of the Ardennes, thence along the Moselle valley to the Rhine and Germany. Another route leads northwards across the plateau to Liége. Much of the land of Luxembourg is rocky or sandy heath and forest. The southern valleys are more fertile, but the population is scanty. The Lorraine iron-field extends into Luxembourg, where mining and smelting of iron is the one big industry. Pig iron is exported to Belgium and Germany.

Summary.—From this brief account of France we may note the following: the French have a much larger area of land than the English; there is more agricultural land at their disposal and they are able to produce their own bread grains. It is not generally realized that France grows almost as much wheat as Canada, and shares third place with Canada as a wheat-producing country. This is a great advantage over the people of England, who must import 230,000,000 bushels of wheat each year. France also grows rye, oats, barley, and maize.

We have seen that the clay vales of the Paris basin, the Moselle, and the Rhine are suitable for the production of sugar-beet. The coal and iron industries and the textile factories of this region provide an excess of cheap labour which is glad to find seasonal employment in the beet fields. Thus France is able to supply a large proportion of the sugar which is required for a population of 40,000,000. Refuse from the beet factories is fed to cattle and swine, and this helps the dairying industry.

The hot summers of central and southern France make it possible to grow grapes. The vineyards are often planted on terraced hill-sides that would otherwise be useless, except for the grazing of sheep. Wines of many kinds are made and a large amount is exported.

The French farmer is a frugal, saving, careful individual. He has long been considered the backbone of the country and his home market has been carefully protected against outside competition. More than half of the people of France live on the land. In a time when world trade in manufactured goods went through a severe depression, there was relatively little unemployment in France. This is worth some study.

EXERCISES

1. The captain of a ship sailing from Hamburg to Singapore has the choice of four possible routes. Which one is the most direct?
2. Can you account for the fact that France is almost self-supporting in the matter of food supply?
3. What grain is widely grown throughout the plain sloping to the Baltic, from eastern Germany to Estonia?
4. In this same region potatoes are also an important crop. What varied uses are made of this plant?
5. Germany is a strong industrial nation. List as many reasons as you can in support of this statement.
6. A coniferous forest belt surrounds the Baltic Sea. What use is made of this forest? What nation buys large quantities of wood products from the Baltic region?

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CENTRAL AND EASTERN EUROPE

Switzerland, Czechoslovakia,
The Danube Lands,
The Balkan States.

Switzerland

In the year 1291 the cantons of Uri, Schwyz, and Unterwalden decided to free themselves from Austrian rule. The rebellion proved to be a success, and the Austrians were driven out. Other cantons joined the federation, and Switzerland came into being. There are now twenty-five cantons, which resemble our municipalities in their freedom to make local rules and regulations. Each canton sends representatives to a National Assembly, meeting at Berne.

Strange to relate, Switzerland uses no national language; 70% of the people speak German, 20% speak French, and 6% speak Italian. The old, native 'Romansch' tongue is now heard only in the most remote villages. All Government documents are printed in the three languages. If a workable union is possible under such circumstances, why not a United States of Europe?

Of the total area, 22% is unproductive and another 22% is in forest, so we may say that nearly half the country is unfit for human habitation. The 4,600,000 Swiss people, then, are living in an area smaller than that of Vancouver Island. Southern Switzerland is mountainous and extends well into the Alpine system; northern Switzerland is bordered by the Jura Mountains, rolling limestone ridges; central Switzerland is a plateau where most of the people live.

Agriculture.—The steep-walled, glaciated valleys of the Alps are inhabited by a farming population which has no rival in the manner in which every bit of soil and pasturage is utilized. Cattle are the mainstay of the Alpine farmer. The floor of the valleys is devoted to the growing of vegetables, root crops, rye, oats, and hay. These are stored away for winter use. In May the herdsmen

drive the cattle up the hill-sides to take advantage of the grass which grows quickly after the snow has melted. The summer pastures are occupied during June, July, and August. The word Alp means a mountain pasture. Here the herdsmen live in rough log houses. The cattle are milked each day and, as it is too far to take the milk down to the valley, it is made into cheese on the spot. In September the cattle are returned to the valley, where they are wintered on the stored food taken from the valley floor.

The plateau lands are also devoted to cattle. Over 85% of the productive land of Switzerland is either under grass or in permanent pasture. From their cattle the Swiss manage to produce annually millions of tons of milk and from the milk they make cheese, butter, and condensed milk and milk powder. Some of the cheese and nearly all of the condensed milk are exported. The milk-chocolate industry is also important.

The Jura limestone ridges are given over largely to the grazing of sheep and goats. The latter are kept for their milk.



Courtesy Government of Switzerland

A sunny workroom in a modern Swiss watch factory.

Manufacturing industries.—The Alpine streams provide many excellent water-power sites, and the rivers which cross the plateau give still more. The Swiss have made use of these extensively to develop much needed electric power. Since coal and iron and other raw materials must be imported, the Swiss have developed industries where much skill and only a small amount of raw material is required. The making of watches and clocks are the best known of such industries. The centres for watch-making are

chiefly in the cities near the base of the Jura Range, Geneva, Neuchâtel, and Basle. Cotton goods, lace and silk goods are manufactured in towns near the Alps, St. Gallen, Zürich, Berne, and others. Salt, potash, and electrical energy have laid the foundation of a large chemical and dye industry. The Swiss are also interested in making electrical goods, and intricate machines used in the textile trades. A good deal of this valuable machinery is exported to other countries.

The tourist trade.—Switzerland has become the playground of Europe. Every summer, thousands of people visit Switzerland to enjoy the scenery and the mountain-climbing. There are a number of beautiful lakes in the country, and these add variety to the visitor's holiday. Hotels and railways cater for the tourist trade and give employment to many thousands of people. In the winter the sports at St. Moritz draw more visitors and a number of hotels keep open throughout the year. It may be said that the tourist trade is one of Switzerland's chief industries.

Communications.—Switzerland lies between Germany, Italy, and France, and controls the head waters of the Rhine and Rhône Rivers. As a result a number of important trade routes cross the country from north to south. The chief route from Germany to Italy passes through Basle and across the plateau to Lucerne. It then follows the Reuss valley to a point only 3,880 feet above sea-level, where it enters a tunnel ten miles long, under the St. Gotthard pass, and appears on the Italian side, descending by way of the Ticino to Milan. One route from France also passes through Basle, while another enters at Geneva and proceeds via the upper Rhône valley and through the Simplon tunnel, twelve miles long, to the valley of the Toce and thence along the shore of Lake Maggiore to Milan. The railways of the plateau are linked with these main highways of trade.

Zürich is the largest of the Swiss cities. It stands at the foot of Lake Zürich on the main line from Basle to the valley of the Inn and the Danube basin. Zürich is a large textile centre, specializing in the manufacture of silk. St. Gallen, near the German border, is noted for its cotton goods. Basle stands at the cross-roads of trade on the Rhine. It is a railway centre and a manufacturing city. Berne has connections east and west. Lausanne has become an important manufacturing centre since the completion of the Simplon tunnel. Geneva stands at the outlet of Lake Geneva where the Rhône flows on into France. The city controls trade routes

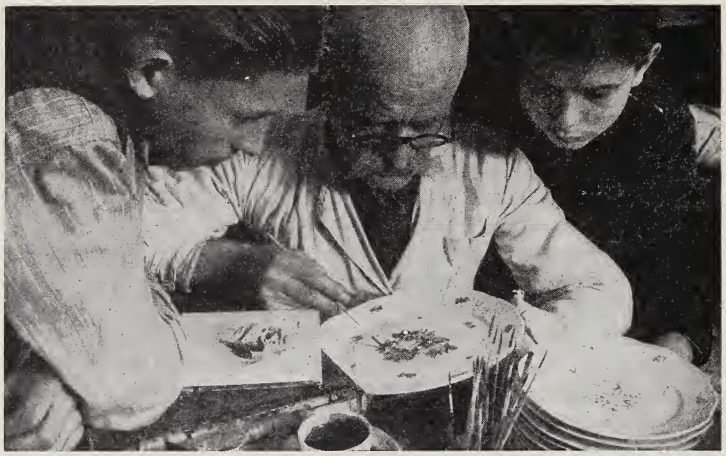
into south-western Switzerland, as Basle does those into the north-western part of the country.

Czechoslovakia

This elongated, mid-European state was another product of the first World War. The old Austro-Hungarian provinces of Bohemia, Moravia, Slovakia, and part of Ruthenia were united to form the Republic of the Czechs and the Slovaks. These people belong to the Slavic group and are closely related in language and customs. The Czechs inhabit the western part, Bohemia; the Slovaks occupy the eastern part of the state.

Bohemia lies south of the Erz Gebirge. It is bounded on the south-west by the heights of the Böhmer Wald and on the south-east by the Moravian Hills. This square block of land is known as the Bohemian massif. The general slope is towards the centre and forms the head waters of the Elbe River, which breaks through the northern rim of the basin. The soil is fertile, especially in the lower courses of the river valleys which enter the Elbe. Agriculture is the chief industry. Sugar-beet and hops are grown in large quantities. Both hops and sugar are exported through the port of Hamburg. This district, although densely populated, is able to produce its own food supply in the matter of vegetables, meat, and bread grains. The arable land is all under cultivation.

Industries.—Bohemia is one of the workshops of central Europe. The rocks of the massif contain coal-beds in the west near Carlsbad, in the south near Brünn, in the east at the Silesian border, and in the north on the upper Elbe. Iron ore is mined near Plzeň; there are radium mines near Carlsbad, while gold, silver, copper, lead, tin, and graphite are mined in small quantities. Hydro-electric energy is obtained from streams which rush down from the surrounding mountains. As a result of these favourable conditions the Bohemian Plateau has for many years been one of the chief iron and steel centres in Europe and the manufacture of many articles gives employment to a large part of the population. Cotton and woollen goods are made at Libérec and other towns along the base of the Riesen Gebirge. Sugar is refined and sent down the Elbe from Aussig. Beer is brewed at Plzeň and Prague, which are in the centre of the hop- and barley-growing district. Glass is manufactured at Jablonec and Bor in the north-west, from sands found there. The glass is made into many articles, such as mirrors, fireproof glass, bottles, beads, buttons, and electric globes. The larger part of the glassware is exported. A china-clay



Courtesy Eastfoto

The apprentices watch closely as an old craftsman instructs them in the art of handpainting porcelain.

deposit near Carlsbad is used in the manufacture of porcelain. There is probably the greatest boot and shoe industry in Europe at Prague and Zlin. The famous Skoda armament works were also in Czechoslovakia, and were heavily bombed by Allied aircraft during the second World War.

Prague is the capital of Czechoslovakia and is situated on the Moldau, a tributary of the Elbe. It is the railway and administrative centre of the massif. Many industries are located at this point, some of which have been indicated. Others are the making of machinery, chemical works, textiles, and glass factories. Plzeň is the chief iron and steel centre of Bohemia.

Moravia

Moravia occupys the lowland between the Bohemian massif and the Carpathians. The River March drains Moravia to the Danube, while a low, broad pass leads through to the head-streams of the Oder and Vistula, the Moravian gate. Throughout these plains agriculture has reached a high state of development. Although sugar-beet, barley, and potatoes are grown on a large scale, as in Bohemia, we find more land in grain, especially wheat and maize. The higher slopes provide good pasturage for cattle, and dairying is an important branch of the farming industry. There are vineyards and fruit orchards in the southern part of the province.

Brünn (Brno), the largest city in Moravia, lies east of a good coal-field. It has cotton and woollen mills, engineering works, tanneries, and leather-goods factories. Bratislava is on the Danube, below the confluence with the March. The boundaries of Czechoslovakia, Austria, and Hungary meet at this point. The city is a river port and railway centre, chiefly concerned in the export of Czechoslovakian manufactured goods to Danubian countries.

Slovakia and Ruthenia

Slovakia and Ruthenia were originally the Carpathian Mountain provinces. The water-parting of the Carpathians formed the boundary with Poland. But in 1945 Ruthenia was incorporated into the U.S.S.R., while the Teschen region, with its coal mines and industrial development, which was formerly divided between Poland and Czechoslovakia, has now come almost completely under the jurisdiction of Poland.

The mountains are well forested, and lumbering is an occupation of the mountain people. Those living in the valleys are engaged in mixed farming. A narrow strip of southern Slovakia extends into the low Danube plain. In this section wheat and maize are grown. There are no large centres of population in eastern Czechoslovakia. Over 70% of the people are engaged in lumbering or in agriculture of some kind.

Czechoslovakia developed into a strong, well-organized state. Although it is six hundred miles long, with no seaboard and with the bulk of its industries in the western part, the courage and loyalty of the people surmounted these natural difficulties. The three gates or doors are of great commercial value. The Elbe gate leads into Germany, the Moravian gate into Poland, the Danube gate to Austria and Hungary. Czechoslovakia was one of the most successful of the nations established after the first World War.

The Danube Lands

The Danube River basin is the great connecting link of south-eastern Europe, just as the Rhine Valley is in western Europe. The upper course of the river drains the Bavarian plateau of Germany; below Passau it is navigable to the Black Sea.

AUSTRIA

Since the end of the second World War Austria, like Germany, has been divided into four zones of occupation which will remain

until a treaty is signed. The boundary line between Germany and Austria ran across the plateau from the Böhmer Wald to the Alps, following in a general way the basin of the Inn, a tributary of the Danube. A contour map will show the eastern Alpine ranges running out into Austria in a number of low tongues. The Inn, Ems, and Drava run easterly between the ranges into the Danube.

The result is that trade is easily carried on down stream to the Danube, but only with difficulty northwards with the Bavarian plateau. Because of this geographic factor Austria developed into a separate country despite the fact that the people speak German. Southern and eastern Austria are Alpine, and resemble Switzerland both in scenery and industrial development. Agriculture is the chief occupation. The cattle are driven to the high pastures in the summer. Lumbering provides winter employment for many of the farmers, the logs being floated down the rivers to the treeless plains of the Danube. As in Switzerland, water-power gives electricity and there are a number of small cotton and woollen plants located in the Alpine valleys. **Innsbruck** is the chief town of western Austria. It is on the main railway line from Vienna to Basle and at the junction of the railway from Munich, via the Brenner Pass, to Verona in Italy. Iron ore is secured at Eisenerz for blast furnaces and machine shops at Klagenfurt and Graz. Mercury, lead, and salt are mined on a small scale. During the second World War the mining of magnesite has become important. Oil wells north of Vienna are also providing a new source of wealth. Coal is scarce and of poor quality, so that much of it is imported.

The Vienna plain is the densely populated and important part of present-day Austria. About two-thirds of the inhabitants live on the plain, and half of these are in the city of Vienna. The plain is bordered on the east by the Bakony forest and outlying spurs of the Carpathians, through which the Danube has cut its way by means of the Hungarian gate. To the west the city of Linz stands at the head of the plain. It commands the entry into the upper Danube above Passau. Wheat, corn, oats, rye, potatoes and sugar-beets are grown on the fertile soils of the plain, but not in sufficient quantities to supply the needs of the people.

The outstanding feature of the plain is the large and beautiful city of Vienna. Its importance through the ages has been due to its position on the Danube River at the meeting point of several river valleys which formed gates through the mountain rim. It dates back to Roman days as a trading centre of importance, and

was the lively capital of the Austro-Hungarian Empire. Vienna is a city of magnificent buildings, palaces, and villas, although many of its famous buildings suffered severe damage in the second World War. Its power as a banking and commercial centre has been greatly curtailed since the collapse of the old empire. It has now a number of small industries, largely of the luxury class, such as the manufacture of silk fabrics, artistic leather goods, fine jewellery and cutlery, cigars and cigarettes. The people have suffered much through unemployment since 1918 and it may be a long time before Vienna regains its former prestige.

HUNGARY

Centuries ago the Magyars, a nomadic, steppeland, Asiatic people invaded the Danube basin and pressed on to the walls of Vienna. On their way they found the broad, grass-covered plain of the middle Danube and proceeded to occupy it up to the surrounding mountain walls. There they remain to this day, essentially agriculturists and cattle breeders, surrounded by Slavonians on the north, Germans on the west, and Yugoslavs on the south.

The climate of the Hungarian plain is continental. The rainfall is less than thirty inches but comes mainly during the growing season, a fortunate distribution. Grapes are grown in the warm valleys opening to the south, as in the valley of the upper Theiss. Some areas east of the Theiss River are sandy and there it is difficult to grow even rye or oats. The rest of the plain, however, is fertile and well populated. The farmers live in small villages; there are few large towns and agriculture and cattle-rearing are the main occupations. Wheat, maize, rye, oats, and barley are grown, and some grapes, sugar-beets, flax, tobacco and hops. The introduction of better breeds of cattle is leading to the development of the dairying industry.

Hungary has few minerals of any importance and is largely dependent for manufactures on her neighbours. Beds of lignite are worked in the west, and hard coal from a small bed in the south. There is some oil and enough iron to support a small iron and steel industry. The most important mineral asset is, however, the plentiful supply of bauxite, the basic raw product of the aluminum industry. Since the plain is largely deficient in fuel and water power, it is unlikely that Hungary will become an important manufacturing nation.

Life in Hungary is one of steady toil. There is enough to eat and to spare, but the sale of grain and meat does not bring in

sufficient money to buy many of the luxuries of life. The condition of Hungary since the first World War has been better than that of Austria with its hungry thousands in Vienna.

Budapest is the capital and the largest city in Hungary. It is situated on either side of the Danube where a rocky eminence approaches the river. It was once a strong fortress town guarding entry to the fertile plain below. The rail lines radiate from this centre and the products of the plain are almost forced to come to Budapest. The city is a great flour-milling centre and has plants for the manufacture of sugar and tobacco, and the brewing of malt liquors.

RUMANIA

These territories were enlarged after the first World War from an area of 56,485 square miles to one of 122,282 square miles. This was a recognition of the principle which was applied, as we have seen, to Poland and Czechoslovakia.

The Carpathians are well wooded up to the 5,000-foot level, beech, oak, and spruce being the principal trees. Lumbering is an occupation of those who live in the foothills. Sheep are grazed on the high pastures during the summer months, and are brought down to the plains during the winter season.

The climate is continental in type. Winters are cold and the lower Danube is closed by ice for a month each year. The summers are hot. Rainfall on the plains is under twenty inches, but the moisture comes during the growing season and the plains are



Courtesy Eastfoto

The countryside in the Rodna Mountains, Rumania.

devoted to the growing of wheat and maize. Rumania is one of the granaries of Europe. The supply of export wheat is variable from year to year owing to the fact that the normal rainfall in Wallachia is just sufficient for the maturing of a crop. A few inches less rain, a dry year, and the crop is ruined by the heat and drought.

Over 80% of the people are engaged in agriculture of some kind. There are few big industries. Iron ore is mined and there are small iron foundries and steelworks. Flour-milling is carried on in a number of places, as at Braila, which is the chief wheat-exporting centre. Saw-milling and the export of timber are carried on at Galatz, the logs being floated down the Sereth and Pruth tributaries. Petroleum is the outstanding natural resource. The wells are north of Ploesti and the oil is exported by pipeline to the Black Sea port of Constanta, an ice-free harbour. The sale of oil amounts in value to about one-quarter of the national exports.

Bucharest, the capital, is well situated on the fertile Wallachian plain. It is the centre of the railway system, with lines leading northwards through low passes in the Alps to Transylvania, and along the plain into Moldavia. The Danube and its tributaries are the main highways of the country. The capital has varied industries such as textile plants, flour-milling, brewing, and sugar-refining.

The Balkan States

YUGOSLAVIA

This state was created after the first World War, from a combination of Serbs, Croats, and Slovenes. These people, the southern Slavs, occupy the territory south of Austria and Hungary. The Croats and Slovenes live in the old Austro-Hungarian provinces of Herzegovina, Bosnia, and Dalmatia, and in parts of Carniola and Styria. The Serbs live in the eastern part of the kingdom bordering on Rumania and Bulgaria. Yugoslavia became a republic in 1945.

The Dinaric Alps are the backbone of the country. They parallel the Adriatic Sea, rising steeply from a narrow coastal plain. The islands along the coast are the tops of another parallel range, now partially submerged. These mountains are composed of almost pure limestone. During the past ages the rain-water has dissolved the limestone and now the streams disappear into subterranean passages. Springs of pure cold water bubbling up along the seacoast indicate where the water finds an outlet. The result

is that large areas of Dalmatia and western Bosnia are very dry. The small streams disappear into shallow holes and are not seen again. The soil is thin and poor, except in pockets here and there. Large areas are very sparsely populated. Where there is pasturage and water, cattle, sheep, and goats are grazed.

The rainfall on the Mediterranean slopes of the mountains is as much as sixty inches. Forests of evergreen trees cover the lower slopes. On the coastal plain and in the small river valleys the Dalmatian farmers grow grapes, olives, and the usual peas, beans, and grain of the Mediterranean region. Wine and olive-oil are exported from this section.

The north-eastern slope, inland to the Danube, is a different country. Here the mountains are composed of harder rocks which have weathered to a fertile soil. The climate is continental, in marked contrast to the mild Mediterranean climate of the Adriatic. Throughout the slope to the Danube the winters are cold but the summers are hot and moist. Although the rainfall is thirty inches or less, it is well retained and distributed through the growing-season. The agricultural land has been cleared of its original forest and is rather densely populated. Lumbering is important in the mountains, which have a mixed forest cover similar to that of southern Quebec. In the beech and oak forests thousands of pigs are herded, and Serbia sells large numbers of these animals each year. In the valleys many fruits are grown. The plum tree is cultivated on a large scale. Plum-brandy or *slivovitsa*, a favourite drink of the Serbians, is made from a part of the crop, the remainder being exported as dried prunes. Grain, vegetables, sugar-beet, and tobacco are also grown by the villagers of central Yugoslavia. Each community is an independent unit, growing its own food and making its own implements as far as is possible. There are few railways, few good roads, and trade with Danube ports is difficult for those who live far south of the river.

The lowland plains bordering the Danube are the best part of the kingdom. Maize and wheat are the important crops as in Hungary. Yugoslavia has a portion of the lower Theiss River basin and the fertile black soil which extends into Hungary and Rumania. Yugoslavia has considerable mineral wealth. It is the chief producer of copper in Europe and has one of the largest deposits of bauxite in the world. In addition it has lead, zinc, antimony and chromite, as well as some iron.

Belgrade is the largest city and the capital. Its situation, at the confluence of the Sava and the Danube, is an excellent one for

trade by river and by rail. A few miles up stream the Drava and the Theiss bring in their share of trade. Down stream the Morava flows in from the south. The main rail route from Vienna to Istanbul passes through Belgrade. Belgrade is also connected by rail with Ragusa, one of the few Yugoslav ports on the Adriatic.

Flour-milling is one of the large industries of the country. There is also considerable brewing and distilling of liquor, cotton-spinning and weaving, tanning, boot and shoemaking, and the manufacture of pottery. Carpet-weaving is one of the oldest industries of Serbia. The carpets are made of pure wool, dyed with natural colours by local dyers whose secrets are jealously guarded. Within recent years manufacturing has been encouraged, but even now many of the exports are unprocessed raw products.

Zagreb, on the upper Sava, is the chief trading centre in the north. The rail line from Budapest divides at this point, one branch running to Trieste and the other to Fiume. Most of the import of cotton yarns for the small cotton mills of Croatia come in over this line. Skoplye, the old Uskub, controls the trade of the upper Vardar. This is the best rail route from Belgrade to the sea.

BULGARIA

In the seventh century A.D. a tribe of Asiatic nomads, allied to the Huns, invaded the lower Danube and displaced the Slavs who were already in possession. The Bulgars, as they were called, made the beginning of the Bulgaria of today.

The surface of the country falls into four well-marked districts: the Danube plains, the Balkan Mountain range, the Maritsa valley, and the Rhodope Mountain block or Macedonian massif. The plain, sloping north to the Danube, is composed of a fertile loess soil and is a rich farming area. Maize and wheat are the chief crops. The Balkan Mountains extend in a wide curve from the Iron Gate to the Black Sea. They are forested, and timber is sent down to the farmers who live on the bare plains. In the mountain valleys oats, rye, and vegetables are grown. The high pastures are used by the shepherds in the summer time.

The Maritsa valley, between the Balkan range and the Rhodope plateau, is a sheltered, fertile region. The climate is much warmer than the northern slope to the Danube. The land is divided into small holdings of five to twelve acres each. The houses are grouped together in small villages for protection against brigands and probably because of the many centuries of wars and invasions



Courtesy Sovfoto

BULGARIA.
A lesson in tractor-driving.

from which this land has suffered. Wheat, maize, tobacco, mulberry trees, and vines are the chief crops. On the southern slopes of the Balkans in the protected valleys, the cultivation of roses, from which attar of roses is distilled, is one of the important industries. Silkworms are raised and some of the cocoons are used in the silk factories at home; the rest of the cocoons are exported.

Sofia is the capital and the only large city of Bulgaria. It is situated in the valley of the upper Isker, which flows through a gap in the Balkan Mountains to the Danube. The Orient express passes through Sofia on its way to Istanbul. A rail line also connects Sofia with the Aegean byway of the Struma valley. Sugar-beet and tobacco are grown in the valley lands around Sofia. Lignite is mined nearby. It is the best coal available and is used on the railways. The principal exports of Bulgaria are tobacco, maize, eggs, attar of roses, and cocoons. The imports are chiefly textiles, metals, machinery, and mineral oils.

In Bulgaria an important pastoral industry is carried on in the rugged uplands of the Balkan Mountains and the Rhodope plateau. Millions of sheep are raised.

ALBANIA

Albania is the least important of the Balkan countries. It is wild and rugged, and, for the most part, uncultivated save for a small fertile area along the Adriatic Sea.

Industry, which is confined almost entirely to agriculture, is very primitive. Each family provides for its own needs, the rearing of cattle and sheep being their main occupation. The mountainous nature of the country, together with long centuries of neglect and misgovernment, have resulted in a land with few roads, no railways, and practically no foreign trade.

It was a monarchy in 1914. Since then it has been in a state of anarchy, a republic, again a monarchy, and finally a republic since 1946. The chief port is Durazzo. Tirana is the capital and Scutari is the largest town.

GREECE

The Pindus Range determines the shape of the country. These mountains are great ridges of limestone and other rocks which send out long tongues into the sea. Where the range disappears under the sea the tops of the mountains stand out as the islands of the Aegean. The range is continued in Asia.

Many of the limestone ridges are completely bare of vegetation. The climate of the peninsula is typically Mediterranean. The rainfall of fifteen inches or less comes mainly during the winter season; the summers are hot and dry. As a result of the porous limestone, the low precipitation and heat of summer, it is difficult



Courtesy Wheeler Newspaper Syndicate

LIDORIKI, GREECE.

A typical mountain village which has been practically rebuilt after the devastation of the second World War.

to conserve enough water for irrigation purposes. The Grecian agriculturist must content himself with land which lies between mountain ridges where silt has collected and where water may be had for irrigation. The farming areas are in patches cut off from one another by mountain shoulders and ridges. It is probably due to the isolated position of many of these small plains, which open to the sea, that a number of city states grew up in the peninsula. As each state grew in population the limited farming area encouraged wars on adjoining sections in order to get a more adequate food supply. It also seems to have encouraged the Greeks to go to sea and make a part of their living by trade or by levying tribute on other peoples around the Mediterranean basin.

The climate of Greece is suitable for the growing of winter wheat and barley. Maize is grown in those valleys where rainfall or irrigation is sufficient. However, Greece is a wheat-importing country. Only one-fifth of the land is under cultivation and this is not enough to supply bread grains for the inhabitants. The olive tree thrives. Olive culture extends in a strip around the whole coast, and export of olive-oil helps to buy bread.

The Gulf of Corinth district is noted for the growing of a small grape which is dried in the sun and becomes the currant of commerce. The old city of Corinth, which stands on the isthmus, has seen better days. A canal, six miles long, connects the gulf with the Aegean, but few of the larger freighters attempt to use it. They prefer to go around the peninsula and escape the toll. Figs, oranges, and lemons are grown in the fertile irrigated valleys of southern Greece. Sheep are pastured on the hills in summer and wintered on the lowlands. There is very little in the way of industries, other than that of agriculture, throughout the Pindus Range and the southern peninsula. Each village and valley is as self-sufficient as the ingenuity of the peasants can make it.

The plains of Thessaly and Macedonia are the only lowland areas of any extent in the whole of Greece. Grain, olives, and tobacco are grown. The bulk of the tobacco crop is exported to Egypt where it is made into Egyptian cigarettes. Salonika, near the mouth of the Vardar, is the important trading centre of northern Greece. Railway lines connect with Sofia and Belgrade. The city is an outport for both Yugoslavia and Bulgaria. It is a cosmopolitan centre where one may hear every tongue of eastern Europe.

Athens is the capital of Greece and a tourist centre of world-wide reknown. It contains a number of remarkable buildings erected

in the days of ancient Greece. The modern city has the usual utilities and services of other western cities, and some fine modern buildings. Peraeus, the seaport of Athens, is the one large industrial centre of the country. It has cotton factories, engineering works, flour mills, and distilleries.

TURKEY

The boundaries of the old Ottoman Empire were severely trimmed at the conclusion of the first World War. In 1922, the National Assembly of Turkey, at Ankara,[1] abolished the office of Sultan and cut the bands which tied the Turks to the religious domination of the House of Osman. This move destroyed the political prestige of Constantinople, and Turkey became an Asiatic country in fact, as it had long been in ideals. Two years later the Republic of Turkey was proclaimed, with Mustafa Kemal Pasha as president.

The European part of Turkey comprises that small section of the Balkans which lies between the lower Maritsa and the Black Sea. These lowlands have fertile soil and the Turkish peasants grow cereals and tobacco. Edirne, the old Adrianople, is the chief trading centre of this region. In the surrounding district the mulberry tree is grown and sericulture is an important occupation. Some silk of an inferior grade is made.

Istanbul, or Constantinople, is still the great trading centre of the Balkans. The main railway line from Vienna ends at this point, while across the narrow Bosporus the Asiatic railway runs from Scutari to Baghdad. Istanbul stands at the cross-roads of trade, where ships from the Black Sea and the Mediterranean meet, where products may be assembled for export or for distribution. The city was once of much greater importance than it is today, for now many vessels pass it by and steam through the Bosporus up to ports on the Black Sea. The wonderful harbour of the Golden Horn still invites the mariner to unload at its quays the varied products of the East.

Asiatic Turkey is a country of considerable area, 294,000 square miles. The contour of this section is that of a plateau bordered on the north by the Pontic Range and on the south by the Taurus. The plateau averages 3,000 feet in height, becoming more rugged towards the east where it rises gradually to the Armenian knot. For the most part the mountains come down to the sea, leaving

[1] Angora.

a very small coastal plain. The Black Sea coast has a rainfall of over thirty inches, the Aegean coast ten inches less. On the plateau, the rainfall is generally less than twenty inches and the climate is severe. The winters are cold, snow covering the higher hills; the summers are dry and hot. The more fertile districts are found in the river valleys which slope westwards to the Aegean. Here the climate is of the mild Mediterranean type.

On the plateau, wheat, maize, and barley are grown. Sheep and goats are pastured over the larger part. This is the home of the Angora goat, from which mohair is secured. Carpet-weaving is an important village industry, although many of the carpets are now made in modern factories, and carpets are Turkey's most important export.

The coastal region is well adapted to the growing of grain, and a fine malting barley is exported. The western valleys are noted for fruits such as the grape, olive, and fig. Raisins are exported in large quantities. The valley of the Meander is important for its fig culture. Tobacco growing is increasing in importance in the west-coast valleys and along the Black Sea coast from Samsun to Trebizond. Cotton is being raised in increasing amounts; much of this cotton is exported since the textile mills of the country are not yet able to use the whole crop.

Turkey is rich in minerals: iron, coal and oil, chromite and manganese, metals useful in making alloys of steel. There are also copper, lead and zinc. Mining of these minerals is being encouraged, and the output is steadily increasing.

Manufacturing is still far from supplying the needs of the people, but a beginning has been made. Already we have mentioned carpet factories and cotton mills. There are also woollen mills, factories making cigarettes, while iron and steel are being produced in increasing amounts.

Ankara, the capital, is situated amid bleak surroundings, but since it lies near the centre of the Anatolian Plateau, it is becoming the centre of roads and railroads which are being built in all directions. It has wide streets and many modern buildings, including those housing the Turkish Government. To show their pride in their new capital the Turks have overcome many difficulties in beautifying the city.

Smyrna, on the seacoast between two fertile river basins, is the principal seaport. Railway lines connect with Scutari, Ankara, and **Syria.**

EXERCISES

1. What are the main trade outlets for Czechoslovakia? Study Austria from the standpoint of its geographic position and compare with Czechoslovakia. Which has the better position? Which country has the larger amount of coal and iron?

2. Budapest is one of the greatest flour-milling centres in Europe. Can you account for this fact?

3. Rumania grows 5,200,000 tons of maize and 2,300,000 tons of wheat in an average year. Some grain is exported to England. Where is the fertile, level land on which these grains are grown? Rumania produces almost as much maize as Argentina, but exports far less. Why should this be so?

4. Why do the Bulgars raise so many sheep?

5. The people of Greece import some bread grains. Does the contour of the country explain this situation?

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23

THE MEDITERRANEAN BASIN

The Iberian Peninsula, Italy,
The Maltese Archipelago.

THE Mediterranean is the largest of the enclosed salt seas. It may be divided into a western and an eastern basin. The western basin is surounded by a mountain wall which lies so close to the shore that only a very narrow coastal plain remains. Entrance to the basin is by the Strait of Gibraltar, nine miles wide and guarded by the famous British fortress. On the northern side the Ebro, the Carcassone gate, the Rhône valley, and the Genoa gap give access to the interior of the continent. Malta and Sicily guard the entrance to the eastern basin, which is larger in area and lies farther south. Here the southern shore line is low and sandy, with the Suez Canal leading into the Red Sea. The rest of the basin is mountain-rimmed. The Adriatic, however, pushes its long arm up between the Apennines and the Dinaric Alps, and the island-dotted Aegean leads to the Black Sea.

Climate.—Over the great sea there prevails a type of climate which we call Mediterranean; that is, a climate which in winter has only a degree or two of frost, but may, in summer, experience 110° in the shade. The rainfall comes during the winter months, but may be less than an inch a month during the long, hot summer. Southern California and the lower Murray valley in Australia have a Mediterranean climate.

Because of the summer heat, irrigation is practised wherever that is possible. Throughout the Mediterranean lands we find every kind and variety of irrigation system. Pressure of population and the narrowness of the coastal plain have brought about considerable terracing of the hill slopes. A number of civilizations have at one time or another grown up within the Mediterranean basin, and for this reason no one language is spoken by the people and there are many distinct races, languages, and governments spaced around the Mediterranean littoral.

The heat of the sun and the clear skies cause a tremendous evaporation of water from this area. There is a constant inflow of water from the Black Sea, from the Nile, Po, Rhône, and Ebro, but the evaporation is greater than the inflow from these sources, and a current sets in from the Atlantic through the Strait of Gibraltar. As a result the water of the Mediterranean has a higher saline content than that of the Atlantic or Pacific ocean. This factor is utilized by the people who let the water into shallow ponds along the shore and by evaporation secure a thin film of salt. This is raked into piles and carted away; then the process is repeated. The Mediterranean is almost tideless. The highest tides are at the head of the Adriatic, but seldom exceed three feet. This is an advantage to shipping but causes the inflowing rivers to form marshy deltas at their mouths.

Vegetation.—The typical Mediterranean plants have adapted themselves to the winter rains and the summer drought. Among these the olive tree is the most important. The olive is a slow growing tree which thrives on otherwise barren hill-sides. It has small narrow leaves which are a help in preventing evaporation during the dry season. The tree produces a fruit from which a valuable oil is extracted. The oil will keep; it does not go rancid, and takes the place of butter. In a land where the spring herbage is so quickly shrivelled up by the heat, it is not profitable to keep dairy cattle, and olive-oil supplies the need for fat in the people's diet. On the other hand we shall find that many goats are kept. The goat will browse on the leaves of hardy shrubs and will climb the steepest hills in search of food. In the Mediterranean it is customary to see the milkman coming down the street with his herd of goats, stopping to milk a pint or so for his customer.

Still other plants which grow in the Mediterranean region are grapes, figs, oranges, lemons, apricots, and chestnuts. Some of these fruits are dried and from them we get our figs, raisins, and currants. Wheat and barley are the chief Mediterranean grains. They are planted in the fall, germinate and root deeply during the winter, and mature in the early summer. However, bread grains are imported by the people of both basins.

The Iberian Peninsula

The Iberian peninsula extends from the Pyrenees to the Strait of Gibraltar. In area it is twice the size of the British Isles but has less than half the population. The central part of the peninsula, the Meseta, is a plateau of old, hard rock with an elevation of 2,000

feet. To north and south are the much younger folded mountain ranges of the Pyrenees and the Sierra Nevada. The Sierra Morena, north of the Guadalquivir, is merely the escarpment edge of the plateau. Three lowland areas may be noted, that of Portugal in the west, the Guadalquivir basin or Andalusia in the south, and the Ebro basin in the north.

PORTUGAL

Portugal occupies the lowland plain which faces the Atlantic. The boundary line of the country follows quite closely the edge of the Meseta, where the streams come out from their canyons and become more or less navigable. The Sierra da Estrella Range, however, cuts Portugal into two parts. North of the range the rainfall is ample, the soil is fertile, and the land is densely populated. The valley of the Douro is noted for its vineyards and the production of port wine. Oporto is the chief trading centre of northern Portugal. South of the Estrella, the Tagus basin is in the rain-shadow of the mountains and large areas are devoted to the growing of grain. Rice is grown on irrigated land along the lower Tagus. Grapes are also grown, the wine being exported to Brazil. The slopes of the Estrella are the chief olive district of the country. Cork-oak grows well in southern Portugal and there are large plantations in the Tagus valley. Lisbon is the capital and the centre of the cork trade. About one-half of the world's supply of cork now comes from Portugal.

Lisbon is situated on a protected estuary at the mouth of the Tagus. It stands on the northern bank and contains many fine buildings which date back to the time when Vasco da Gama opened the trade route to India and Portugal became a great maritime colonial power. The country of Portugal is today in a somewhat backward condition. Half the land is uncultivated, and farming methods are, for the most part, antiquated. The roads are in poor condition and there is little education outside the large cities. The mild climate and maritime position of the country are such that Portugal could easily become a strong and efficient state. At present it is an example of indifferent human use of favourable natural conditions.

SPAIN

The Cantabrian and Pyrenees mountains form the northern boundary of the peninsula. The mountains are forested, with bare

summits rising to 10,000 feet in the eastern part. The Cantabrian Range dips under the sea in the west, where numerous drowned valleys provide good harbours. Fishing is carried on, with Vigo as the chief port. There is agriculture in the valleys, the well-watered pastures containing nearly half the cattle in Spain. Maize is an important crop, while potatoes, beetroot, and fruits are also grown. Sardines and tunny are caught by the home fishermen, the deep-sea fishermen sailing as far as the cod banks of Newfoundland.

A further source of wealth lies along the northern flank of the Cantabrians, where coal and iron are found. The coal-beds are in the Oviedo district and produce most of the coal mined in Spain.



Courtesy Government of Spain

Picnic grounds at La Sierra, near Madrid.

The presence of the coal has helped in the establishment of iron and steelworks at Oviedo and Bilbao, where the iron is mined. Some iron ore is exported to England. The Cantabrian district of Spain is one of the most thickly populated areas and one of the most productive in the whole country. Spain also leads in the production of mercury.

The Pyrenees are largely given over to the grazing of sheep, although there is a small lumbering industry. They still act, as they have done throughout the past, as a barrier shutting off the Iberian peninsula from the rest of Europe. However valuable the Pyrenees may have been in other days, they are a hindrance to the trade and commerce of the present. Railway routes enter Spain at

either end of the range. There is no low pass through the mountains, as in northern Italy.

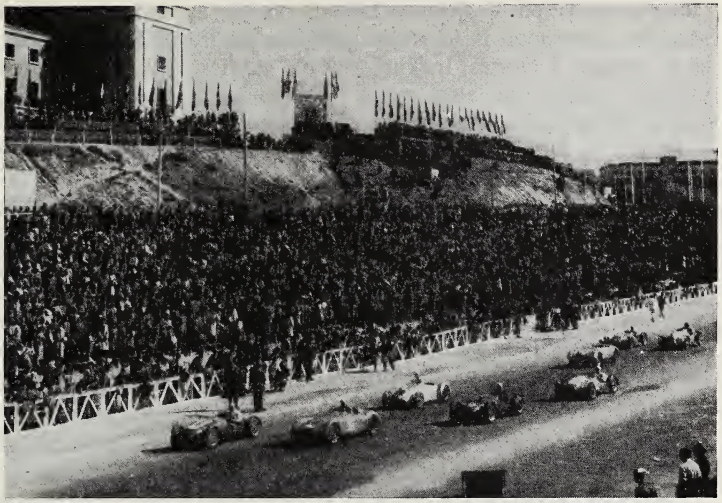
The Ebro basin is a lowland area between the Pyrenees and the Meseta. The climate is dry since the Ebro lies in the rain-shadow of the Cantabrians and the Meseta. Wheat is grown, dry farming methods being used to conserve the moisture. Olive trees grow on the valley-sides, and where irrigation is possible, vines, maize, sugar-beet, and tobacco are grown. The winters are too cold for orange trees. The larger part of the basin is a sparsely populated range land. The river is not navigable and is of little use as a highway. Saragossa is the chief market town of the Ebro basin.

The Meseta, or plateau of central Spain, is a high, rugged block of old rock. The slope is towards the west, and the streams drain to the Atlantic. They have cut their way so deeply into the plateau, however, that they are of little use for irrigation. The climate is continental, the winters are cold, the summers are hot, and there is little rain at any time of the year. The altitude, two to three thousand feet, and the clear air make for extremes of temperature even between the heat of the day and the cold of night.

To the north of the Sierra the district of Old Castile comprises the water-shed of the upper Douro. It is possible to grow wheat in this district, and good crops are secured where land is under irrigation. Valladolid is the chief town and has a large flour-milling industry. South of the Sierra de Guadarrama, the plain of New Castile is drained by the Tagus and the Guadiana. Throughout this section the rainfall is even less. The Meseta is a pastoral land, and sheep raising is the chief occupation of the people. This is the home of the famous merino sheep, which gives wool of the finest quality. Similar dry, hot areas in Australia now carry merino sheep, introduced originally from Spain.

Madrid, the capital, on a tributary of the Tagus, is the one large city of the Meseta. The central location is a help in governing the country and it has been made the hub of the Spanish railway system. It has a few establishments for the making of clothing and the milling of flour, but has no opportunity of ever becoming an industrial centre. Toledo, an old city at a bend of the Tagus, is overshadowed in importance by the proximity of the capital.

The Guadalquivir basin is a lowland area between the Sierra Nevada and Meseta and corresponds to the Ebro basin in the north. The Guadalquivir drains to the Atlantic and receives winter rains. The soil is a fertile silt and the basin is a garden of productivity. A large part is under irrigation. Cadiz, Seville, and



Courtesy Government of Spain

Automobile races at the Madrid racetrack.

Córdoba all tell of the fertility of Andalusia and its mild and equable climate.

Olive trees and the vine flourish throughout the entire region. Wheat, maize, and vegetables provide a local food supply. Cadiz is the chief port of south-western Spain. Along the shore are large ponds for the evaporation of sea-water. Seville is at the head of navigation of the Guadalquivir and deals in olive-oil, pickled olives, oranges, and cork. Córdoba is an old centre of the Moorish civilization which was once in control of the peninsula.

The Mediterranean coastal plain.—From Malaga to Valencia the coastal plain is crossed by small streams which head either in the Sierra Nevada or in the escarpment of the Meseta. Irrigation is a necessity. There is a rather dense population and the land is so valuable that the hill-sides have been terraced. On the irrigated *huertas,* two crops a year are grown, one for food, the other a money crop.

The vine is cultivated on a large scale, and raisins are exported from Malaga and Alicante. Grapes, wine, oranges, and lemons are shipped to England.

Catalonia.—This province of Spain is noted for its great city of Barcelona, which stands midway between the mouth of the Ebro and the border of France. The main rail line from Marseilles

along the coast passes through the city on its way to Saragossa and Madrid. Barcelona is the manufacturing centre of Spain. It has large textile factories making cotton fabrics; silk, linen, and woollen goods are also made. Other factories make paper, leather goods, and machinery.

Barcelona has no particular natural position to account for its size and importance as an industrial centre. It is situated in the north-eastern part of the country, it has no coal or iron near at hand and it is not the only harbour along the coast. The climate is hot. A possible explanation lies in the people themselves. The Catalans speak a language different from Spanish; they are vigorous, energetic and determined to make things go. Many parts of Spain show the decadence of a once great people, but in Barcelona the spirit of the people has triumphed over the surroundings.

Gibraltar

Gibraltar is one of the strategic British naval bases. It occupies one and seven-eighth square miles, at the southern extremity of Spain, and effectually guards the narrow Strait of Gibraltar, the sole western gateway to the Mediterranean Sea.

North-west African Islands

The islands of the Azores and the Madeiras, which belong to Portugal, and the Canary Islands, which belong to Spain, lie within the Mediterranean climatic belt. They produce the usual fruits and early vegetables of that region. They are of volcanic origin and have a fertile soil.

Funchal, in the Madeiras, is a popular winter resort. Angra is the chief town in the Azores. In the Canaries, the Fortunate Isles of olden times, Las Palmas is the capital and commercial centre.

Italy

The Republic of Italy is a well-defined country. The Alpine ranges form a protective arc from the Riviera to the Adriatic. Within this barrier and on the peninsula there has developed a strong and vigorous civilization which has its roots in Roman times of two thousand years ago. No other country in Europe, except Greece, can boast of such a background.

The Apennines are the backbone of the peninsula. Beginning at the Gulf of Genoa they bend first to the east, then swing back

to the west, to reappear in Sicily. This arrangement provides fertile areas on both coasts.

The Alpine region.—The southern slopes of the Alps are much steeper, and much warmer than the slopes to the north. The protected valleys, which have a southern exposure, have a Mediterranean climate. Olive groves and vineyards are found throughout the lower slopes. Cattle and sheep browse on the high pastures in the hills, during the summer. The supply of electricity from the mountain torrents has led to the establishment of a number of manufacturing centres at the base of the mountains.

Although the Alps are a protective barrier against invasion, there are a number of passes through to the northern plain. The chief ones are the Mont Cenis, St. Bernard, Simplon, St. Gotthard, and Brenner passes. By these routes trade has long been carried on between Italy and the people who live to the west, north, and north-east. The Brenner Pass is only 4,500 feet in altitude.

The Po River basin, sometimes called the Lombard plain, is the great fertile area of northern Italy. It is densely inhabited, containing nearly half the population of the country. The soil varies in fertility, from the rich alluvium of the lower Po valley to the glacial sands and gravels along the base of the mountains. As a result large areas near the Alps are kept in permanent pasture. There is another pasture belt in the lee of the Apennines. Cattle raising and dairying are important industries. Large amounts of cheese are made, notably Gorgonzola and Parmesan varieties. Two-thirds of the Italian cattle are found in the Po basin.

The Alpine streams bring down an immense amount of sedi-



Courtesy Richard Mathews

Italian housewives doing the family washing in a stone trough fed by a mountain stream.

ment which tends to clog their lower courses as well as the Po itself. The sediment gradually raises the level of the river bed, and hundreds of miles of dyke have been built to confine the streams. However, this feature is of considerable advantage in the construction of irrigation works. The winters on the plain are much colder than in the protected valleys; too cold for the growth of the olive or orange. Wheat and barley are grown throughout the basin. Maize and rice are the chief crops on the irrigated lands. The best rice fields are south-west of Milan and near the mouth of the Po. The rice is of excellent quality, and a large part is exported. The home demand is filled by imports from Asia. Polenta, made from maize, is the chief food of the agricultural labourer. The farms are small, from three to ten acres in extent, and there is much careful work with spade and hoe. Other crops include vegetables, flax, and hemp.

Mulberry trees are grown along the roadsides, on the river banks, along the dykes, and between the fields. Silkworms are reared and the spinning of silk is an important industry at Como, Bergamo, and Milan. The weaving is conducted principally at Milan, which comes next to Lyons in this industry. The silk is of a high quality and commands a good price and a ready market. The silk trade has, in fact, developed far beyond the local supply, and much raw silk is imported from Japan. Although Italy has no coal, the increasing use of hydro-electric energy from Alpine streams helps to overcome this handicap, and industries continue to develop in the region of the upper Po valley. Factories have been established to manufacture hemp from the local product and there are also some jute factories. Cotton and woollen goods are made, the former on a large scale. Italy exports an increasing amount of cotton fabrics. Raw cotton is imported from the United States and Egypt.

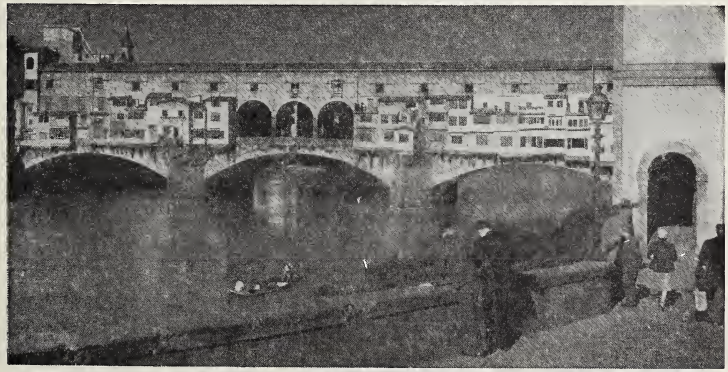
Milan is the chief industrial centre of the upper Po. Trade routes lead over the Alps by way of the Simplon Tunnel and St. Gotthard Pass. An important line runs southwards through a low Apennine pass to Genoa, which has become the principal import-export centre for the industrial cities of northern Italy. Because of its many trade routes Milan also manufactures railway equipment, machinery, automobiles, and electrical supplies. Turin commands the trade route through the Mont Cenis Pass. It is a railway centre and is noted for the manufacture of automobiles. Verona and Bologna are other industrial towns of the Lombard plain. Note that each city controls a pass or trade route: Verona,

the Brenner Pass; Bologna, the pass through the Apennines to Florence and Pisa.

Venice, the city of canals, is built upon a number of small islands north of the Po delta. For centuries Venice controlled the larger share of the trade of the eastern Mediterranean. Spices and silks of the East were brought in by vessel and sent inland via the Brenner and eastwards by the Udine route to the Danube. Discovery of the Cape route to India destroyed the central position which Venice enjoyed, and the building of the Suez Canal made matters worse. Genoa became the more important of the two northern Italian ports. Trieste and Fiume control trade with northern Yugoslavia and Hungary.

Peninsular Italy.—The central Apennines are composed of broad limestone ridges. Sheep rearing is a common occupation throughout the mountains, the flocks being driven to the lowlands during the winter season. The eastern coastal plain is followed by the railway from Bologna to Brindisi. From the latter port, passengers and mails go to Egypt and the East. The plain is broken by mountain spurs and river courses. Irrigation is used wherever possible. Wheat, hemp, and vegetables are grown. These are many olive groves and vineyards. Wherever there is good soil the countryside is thickly populated.

The West coast may be divided into the Arno basin of Tuscany, the Tiber basin, and the Campania of Naples. The plains of Tuscany are an intensively cultivated garden. Fruit trees, the vine,



Courtesy Richard Mathews

The *Ponte Vecchio,* which crosses the Arno River in Venice, is over six hundred years old.

mulberry and olive trees, grains, and vegetables, are all grown. Leghorn is noted for its production of straw hats made from a fine type of local straw. Florence is on the main trade route from Bologna to Rome. Besides being a railway centre it has many wonderful buildings, statues, and paintings, which are relics of medieval days and attract many tourists. Pisa is noted for experiments which Galileo conducted, and for its leaning tower.

The Tiber basin contains the largest of the peninsular streams. The plain of the lower Tiber, the Campagna, was once a fertile, well-drained agricultural area; but the silting up of the Tiber and the neglect of the drainage ditches caused the Campagna to become an unhealthy malarial swamp, a place for shepherds to winter their flocks on the tough herbage. During recent years, however, the Government has undertaken some large reclamation schemes and the Campagna is beginning to produce crops similar to those of Tuscany. It is an outlet for the growing population of Italy.

Rome, the capital of Italy, is situated on seven small hills which rise from the plain. From Rome small vessels can sail down the Tiber. Civita Vecchia is the modern seaport. Rome is well situated to be the governing centre of Italy. The main road along the coast crosses the Tiber at this point, while the Florence-Bologna route leads directly to the lower Po valley. The city surrounds the independent city of the Vatican, headquarters of the Roman Catholic Church and the residence of the Pope. Relics of ancient times make Rome a great tourist resort and the tourist trade is probably its chief industry today.

The Campania of Naples is a volcanic plain with the usual fertile soil found in such regions. Here again we find a garden of cultivation and a dense population. Wheat and maize are grown for food. Olives, grapes, oranges, and lemons are the chief money crops. Naples is situated near Mount Vesuvius on a beautiful bay and close to the plain. It is one of Italy's chief manufacturing centres. The harbour is the best along the coast south of Leghorn. The ease with which coal and raw materials can be collected, the supply of cheap labour from the densely populated plain, together with hydro-electric energy from the Apennines, have combined to give Naples its present position in trade and manufacture. Among the important factories are those making flour, macaroni, lace, and textiles. There are also large engineering works and plants for making oils, paints, and chemicals.

Sicily is separated from the 'toe' of Italy by the Strait of Messina. The island is volcanic, and Mount Etna is continually sending up its plume of smoke. The soil is fertile and the coastal districts are thickly populated. Olives, grapes, oranges, and lemons are grown in profusion. Wheat is grown in the dry interior. Palermo, on the northern shore, is the chief port and trading centre. A railway runs eastwards to Messina, where ferries connect with Reggio on the mainland. In the district around Etna many thousand tons of sulphur are recovered each year.

Sardinia is a rugged, mountainous island, a remnant of an old block of mountains which once extended westwards to Spain. The Sardinian mountains, which rise to heights of six thousand feet, are forested, but the soil is poor in comparison with that of Italy. Sheep and goats are pastured on the hills in the summer. The small coastal plains and the terraced hill-sides grow grapes and olives. Tomatoes are canned for export. Salt is secured by evaporation of sea-water, and quite a number of people are engaged in fishing. Cagliaria is the chief port. Sardinia belongs to Italy.

Corsica

Corsica is similar in contour to Sardinia, several peaks rising above 8,000 feet. The people are of mixed origin but, for the most part, resemble the Italians. The island belongs to France. Products are of the usual Mediterranean type. Ajaccio, the birthplace of Napoleon, is the best-known town and seaport.

The Maltese Archipelago

The larger island of the group, Malta, is ninety-five square miles in area, Gozo is twenty-six square miles, and Comino a single large rock. Malta became British territory in 1814 and is England's naval base in the central Mediterranean. The two islands have a population of over 240,000. The 43,000 acres are divided into 11,000 holdings, which gives an idea of the size of the garden patches. Wheat, barley, potatoes, onions, beans, vegetables, and cumin-seed are grown. Sheep and goats are kept, the latter for their milk. The island is unable to produce all of the necessary foods, and wheat, flour, sugar, and cattle foods are imported. Textiles are the largest single item of import. The Maltese are noted for the excellence of their hand-made lace, the manufacture of which is carried on as a cottage industry.

The harbour of Valetta is one natural feature which makes the

island of Malta a valuable possession. It is a supply and refitting station for Britain's Mediterranean Squadron and a coaling station for merchant vessels. Valetta is strongly fortified and controls the passage between Sicily and Africa.

EXERCISES

1. Why has Spain more sheep than Italy?
2. Why has Italy more cattle than Spain?
3. Of what use are goats in a country with a Mediterranean climate?
4. Why has Spain more goats than Italy?
5. Does a study of the climate of Spain help you to understand the reliance on horticulture? Are irrigation systems used? What country in North America grows similar fruits? Is the climate similar?

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24

THE UNION OF SOCIALIST SOVIET REPUBLICS

The Union of Socialist Soviet Republics, or the U.S.S.R. as it is more commonly called for the sake of brevity, is an amazing country. It is a land of many superlatives. We, in Canada, are used to vast distances, great rivers, high mountains, lengthy railroads, great mineral wealth, and a rapidly expanding economy, but in all these respects the U.S.S.R. enormously outstrips Canada. Just as the United States is spoken of as 'The Giant of the Western Hemisphere', so the Soviet Union is 'The Giant of Eurasia'. Although both India and China have a greater population, the



Courtesy Sovfoto

May Day in Moscow.
A parade of the troops of the Moscow garrison in Red Square.

Soviet Union far exceeds them in size and in industrial development.

The Union of Soviet Socialist Republics consists of sixteen national republics. Each is known as a 'Soviet Socialist Republic'. These are the Finno-Karelian, Estonian, Latvian, Lithuanian, Byelorussian (or White Russian), Moldavian and Ukrainian Republics along the western borders, the Georgian, Azerbaijan and Armenian Republics in the Caucasus; the Kazakh, Turkmen, Uzbek, Tadjik and Kirghiz Republics in Soviet Central Asia east of the Caspian Sea; and last of all the great Russian Soviet Federated Socialist Republic, with by far the greatest area and population. Each of these republics has its own constitution, according to the constitution of the U.S.S.R. As a matter of fact, Russians often compare their Union to our Commonwealth of Nations: the comparison, however, is not accurate, since their Union government has a control over all its republics, which does not exist in our Commonwealth. Within some of the Union Republics, particularly the Russian Republic, there are Autonomous Republics, Autonomous Provinces and National Regions. These contain national groups of more or less backward people, such as the Yakuts in north-eastern Siberia. These people, too, have some measure of local self-government and are encouraged to form Soviet Republics as soon as possible.

The Soviet form of government, while democratic according to the Russian point of view, differs so markedly from our political pattern, that it is most difficult for us to understand. One thing is certain, 'the State' is all-important in the Soviet Union, and exerts a control over the whole population, unlike anything we know here.

The people of the Soviet Union.—Within the borders of the Soviet Union are a large number of widely differing national groups, from the White Russians and Ukrainians in the west, to the nomadic Kirghiz shepherds in Soviet Central Asia and the Yakuts and Chuchis in the far north-east. A remarkable and apparently fairly successful effort has been made to educate those groups which were backward, and to preserve the language and culture of each group.

Extent of the Soviet Union.—We know, of course, that the Soviet Union stretches across the great land mass of Eurasia from the Baltic Sea to the Pacific, but it is worthwhile to compare its northern and southern limits with those of Canada, its counterpart

in North America. In Canada, only Cape Bathurst east of the Mackenzie delta, the Boothia Peninsula, and some of the northern islands, lie north of the 70th parallel. All these northern regions are practically uninhabited. In Siberia from the Kara Sea eastwards, the main land mass, including the mouths of the Ob, the Yenisei and the Lena Rivers, is north of 70°N. latitude. If we move south to the 60th parallel, in Canada we include the Yukon, the Northwest Territories and the northern tip of Quebec, where the population is still extremely sparse, engaged almost entirely with mining and fishing and the fur trade. In the Soviet Union, this brings us to the latitude of the great city and port of Leningrad, which at one time had a population of about three million, and the still more northerly cities of Murmansk and Archangel in Europe, and Igarka, on the Yenisei.

Moving to the southern boundaries, we discover that the southern boundary of the Caucasus reaches considerably south of the 40th parallel, farther south than any part of Canada, about as far south as Washington, D.C. The Turkmen Republic, east of the Caspian Sea, extends even further south, to about the latitude of Los Angeles.

While most of our industry and the greater part of our population lie south of the 50th parallel, Moscow, the capital and largest city of the Soviet Union, as well as the industrial regions of the Urals, the Kuznetsk Basin and Lake Baikal are all north of this line. Thus we see that the Soviet Union extends both farther north and farther south than Canada, and that the bulk of Soviet industry and population lies farther north than the industrial regions of Canada.

During and after the second World War, the Soviet Union annexed several districts along its boundaries: the Petsamo district and Karelia from Finland, the three independent Baltic Republics, Esthonia, Latvia and Lithuania, Memel and a part of East Prussia from Germany, eastern Poland, Sub-Carpathian Ruthenia from Czechoslovakia, Northern Bukovina and Bessarabia from Rumania, the Tannu Tuva People's Republic, Southern Sakhalin and the Kurile Islands from Japan. Some of these districts had been a part of Russia before the first World War. These annexations added over 24,000,000 people to the Soviet Union, making a total estimated population of over 202,000,000.

The coastline of the Soviet Union.—The coastline of the Soviet Union measured in miles is enormous. Moreover it has access to the Arctic Ocean, the Atlantic Ocean through the Baltic Sea, the Black Sea, the Caspian Sea and the Pacific Ocean. How-

ever, various difficulties have kept the country a great land power, rather than a sea power. The Arctic, as we know, is closed to navigation except during the short summer season. Exit from both the Baltic Sea and the Black Sea is under the control of foreign nations. The Caspian Sea is landlocked, and the coastline of the Pacific is far to the north. Even Vladivostok, the most southerly port, is often frozen over for several weeks. Most of the maritime trade is carried on through the Black Sea; even here Odessa, the chief port, requires an ice breaker to keep the harbour open during the winter. Far to the north Murmansk, so often in the news during the second World War, is ice free, thanks to a tongue of the North Atlantic Drift.

The surface of the Soviet Union.—In so enormous a country it is to be expected that there will be a great variety of relief. In a sense this is true, but an unusually large part of the country is a low-lying plain. In Soviet Europe, where most of the people live, there is little else but a level monotonous plain, with a low divide separating the rivers emptying into the Arctic Ocean from those flowing into the Black and the Caspian Seas. Even the Ural Mountains rise so gradually in the west that the rivers flowing in that direction are navigable almost to their source.

Extending about 1,250 miles east of the Urals, and from the Arctic Ocean to the Kazakh Uplands and the foothills of the Altai Mountains, are the Central Asiatic and Siberian lowlands. In the basin of the Ob River, they are particularly swampy, as they were fairly recently in geologic history covered by an arm of the Arctic Ocean. Around the northern end of the Caspian Sea is the dry Caspian Depression, considerably below sea level.

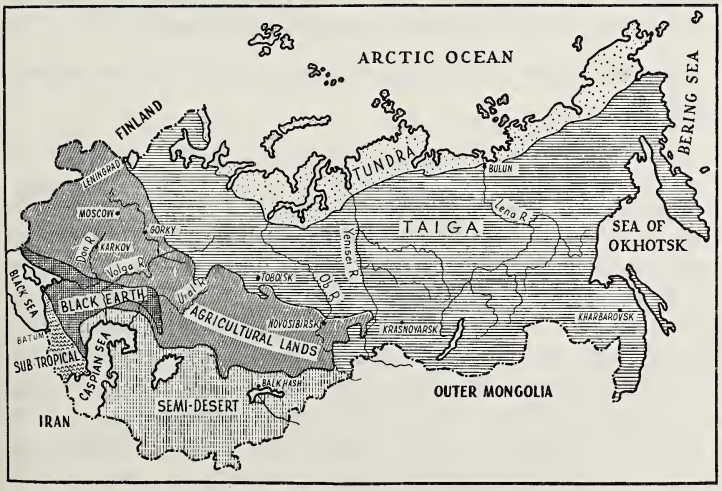
Between the Yenisei and the Lena Rivers is an ancient plateau, while beyond the Lena rises the Verhoyansk and Stanovoi Mountains. Along the southern borders rise the Caucasus Mountains in Europe, and the Hindu Kush, Altai Tien Shan and Yablonoi Mountains in Asia, some of the highest mountains in the world.

The rivers of the Soviet Union.—Any Canadian can understand the importance of rivers in the development of a country. To a greater degree even than Canada, the Soviet Union is dependent upon its rivers, several of which are longer than the Mackenzie and the St. Lawrence. Like most Canadian rivers, the Soviet rivers freeze in the winter and flood in the spring. The great rivers of Siberia flowing down to the Artic Ocean thaw first near their sources, thus flooding the frozen land beyond their banks. During the summer season, when they might be of most use, many of the

southern rivers are low, making navigation difficult. In spite of all these difficulties a large proportion of the freight of the Soviet Union is river-borne. Of all the rivers, the Volga leads in the amount of freight it carries.

Because of the low relief of European Russia, it has been possible to build canals to join many of the rivers. Thus it is possible to pass by water from the Black Sea or the Caspian to the Baltic or the White Sea or the Arctic Ocean. The Russians call Moscow 'the city of five seas'. Within recent years dams have been built on many of the European rivers, both to develop hydro-electric power and to regulate the flow. In the dry regions of South Central Asia, some of the rivers, notably the Amu-Darya and the Syr-Darya have been dammed for purposes of irrigation.

Climate.—Generally speaking, the Soviet Union has a continental climate, which increases in extremes from west to east; however it is never safe to generalize concerning a large area. Winters are cold and long in duration throughout the whole northern region. The ground in the tundra is permanently frozen a few feet below the surface. Only a few of the most southerly regions are free of the danger of winter frost. In the dry, clear air of north-eastern Siberia the winter cold is intense, and Verhoyansk, east of the lower Lena River Basin, is often spoken of as 'the cold pole' of



NATURAL REGIONS OF THE U.S.S.R.

the earth. In the summer, however, the heat is extreme, due chiefly to the long hours of sunlight in this Arctic outpost. The range between the maximum and minimum recorded temperatures is 180°—a world record.

Generally, the precipitation of the Soviet Union is light, and since the prevailing winds, except in the south, are from the west, rainfall decreases from west to east. The maximum rainfall, however, comes during the summer months when it is most needed. In Soviet Europe the regions of greatest precipitation are the Smolensk district, south-west of Moscow (about 25 inches), the western slopes of the Urals (about 24 inches), and the eastern shores of the Black Sea, at the base of the Caucasus Mountains (98.5 inches at Batum).

In Soviet Asia the annual rainfall is even less than it is west of the Urals—about 6 inches in the Caspian Depression. To the south, at the base of the Hindu Kush and Altai Mountains, precipitation increases to between 17 and 20 inches and the rivers carry melted snow from the mountains. On the Pacific coast of Siberia, south of the 58th parallel, summer rains of the monsoon type raise the total amount of precipitation to a maximum of 40 inches on the south-east coast of the Kamchatka Peninsula.

Snowfall is heavy in the northern forests, but light on the treeless plains of the Ukraine and Soviet Central Asia, bringing an early spring to these important agricultural regions.

Natural Regions.—The U.S.S.R. can be divided into four natural regions.

(i) The Tundra

The northern part of the Soviet Union is in many respects like Canada, although the Soviet tundra is much greater in extent, covering about 10% of the total area of the country. There are the same marshes and swamps, the same mosses, lichens, coarse grasses, flowers, low gnarled bushes, and the same clouds of mosquitoes. This region is inhabited by people very similar to the Canadian Eskimos, who roam about and live by fishing, hunting and trapping. The reindeer is much more common than it is in Canada, and more and more settlers from European Russia are being sent into this bleak country to develop its resources and form settled communities.

(ii) The Taiga

This is the name the Russians give to the endless miles of dark coniferous forest stretching all the way from Finland to eastern Siberia, and covering half the area of the Soviet Union. Natural conditions here are very similar to those in the forest belt of northern Quebec and Ontario. Lumbering and trapping are the two chief industries. The trees are felled during the winter and floated down the rivers in the spring. Unfortunately most of the rivers of the taiga flow to the north, away from the railroads and the chief centres of population.

Where minerals occur, mining communities have grown up, and to supply these and the lumbering towns, clearings have been made where crops are raised. However farming is difficult, for the growing season is short and the soil is poor. Much is being done by scientists to overcome these difficulties, but the taiga will never make good farm land, and except where minerals make manufacturing possible, it can never support a large population.

South of the taiga lies a belt of mixed forests, where hard woods like oak, ash, beech, elm and maple, are mingled with the conifers. This belt is wide in Europe, but narrows down and eventually disappears in Siberia. Here the soils are deeper and more fertile, and much of the forest has been cut over. This region has many swamps and peat bogs. Agriculture is more successful in this zone, a greater variety of crops can be grown, and population is often dense.

(iii) The Steppes

South of the mixed forest belt and sloping down to the Black Sea and the Caspian, lie the open treeless grasslands or steppes, similar in many respects to our western prairies, but generally speaking drier. Much of this region is known as the Black Earth Belt. It has deep, rich, dark soil and is one of the finest areas of farm land in the world. It is ideal for grain crops, particularly wheat. In Siberia the steppe belt is much narrower, and being drier is more suited to pasturage.

North and east of the Caspian Sea lie the dry steppes and actual desert areas. Over these still roam nomadic tribes, with their flocks of sheep and goats. Irrigation has transformed some of these dry areas, particularly in the south, and where minerals have been discovered settled communities have been started even in the desert. The two largest sandy deserts are the Kara Kum,

south-east of the Caspian Sea, and the Kazil Kum, between the Amu-Darya and the Syr-Darya Rivers.

(iv) The Sub-tropical Regions

We are often inclined to forget that such regions exist in the Soviet Union. They are, to be sure, restricted in area and few in number, but they permit the cultivation of crops which would otherwise be impossible in the Soviet. One of these regions occurs around Batum on the Black Sea, one on the south-eastern shore of the Caspian, one in the Crimea, one in the Transcaucasus and one in the mountain valleys of Soviet Central Asia.

Soviet Agriculture.—In Tzarist Russia the country was chiefly a land of peasant farmers. The peasants did not live each on his own farm as is customary in North America; they lived in villages and worked strips of land, often some distance apart. Since the Revolution of 1917 a remarkable change has taken place, so that farmers form less than 50 per cent of the total population. Even so, the Soviet Union is one of the greatest agricultural nations of the world and in a normal year leads all other nations in the production of potatoes, flax, hemp, and most of the grains. The Soviet Government has developed several forms of what might be called large scale industrial agriculture. First, there are the State Farms. Their average size is about 10,000 acres. They are of various types from reindeer farms in the north to tea, tobacco and cotton farms in the south. Each has an experimental station, a technical school, and often an agricultural college. On these farms the workers are paid according to the work done. Secondly, there are the Collective Farms. These have an average area of about 1,000 acres. All land and animals are jointly controlled by the members of the collective. Farmers do not own their land in the Soviet Union. The workers live in a village supplied with schools, hospital and nurseries. Each family has a small garden, a cow, and a few pigs and hens for its own use. Every possible use is made of agricultural machinery, such as tractors and combines. All such machinery is owned by the state and rented to the collective. The farmers work in 'brigades'. Each is paid for work done and each has a share in the profits remaining from the sale of the crops, after all government claims, such as taxes, rent for machinery, and advice from government experts have been met.

Being such a large country, with so many different types of climate, the Soviet Union is able to produce practically every necessary crop. Moreover, because the country has what is called

a 'planned economy', each crop is grown in those areas best suited to its culture and in an amount fixed, on the advice of its technical experts, by the central planning body called the Politburo. Workers are distributed where and when they are needed. Here and there throughout the country are experimental farms and research institutes, similar in purpose to our National Research Council, and our various agricultural colleges and experimental farms. Here workers experiment with various useful plants to permit their growth over a wider area; thus, as in our own country, strains of wheat have been developed which will grow where wheat did not grow before. The same is true for many other crops such as cotton, tea and mulberry trees, which normally could be grown only in very restricted areas of the Soviet Union. Much has been done with various plants from which natural rubber may be extracted. Such are the several varieties of the sagiz plant, as well as the guyule plant cultivated in the United States and Mexico.

Agriculture.—Since the agricultural production of the regions of the Soviet Union is so diversified, the main regions will be discussed separately.

(i) The North

The aim of the Soviet planners is to make the lumbering, mining and trapping communities in the far north as far as possible self-sufficient. Hay, hardy grains—oats, rye and sometimes wheat, are grown, as well as hardy root crops and green vegetables. The long summer days help to offset the short growing season. For winter use, and for crops which mature more slowly, hot houses are used. For meat, milk and eggs, farm animals are kept in sturdy, warm stables.

The greatest concentration of farming is naturally in Europe, where the population is greatest. In the area around Leningrad some wneat is grown as far north as 62°. Flax, rye, barley, oats, potatoes and vegetables are grown and dairying is important. Farther south rye is grown as a winter crop, and sugar beets are one of the chief summer crops.

(ii) The Ukraine

The Ukraine is one of the richest agricultural regions in the world. Wheat is the most important crop, but winter rye, flax, sugar beets, oats, barley, corn, hemp, and sunflowers are also grown. Orchards are common, particularly in the west where the

rainfall is heavier. Around the north-east shores of the Black Sea, cotton and tobacco are important. Much the same crops as those of the Ukraine are cultivated in the Black Earth region of Siberia.

(iii) The Semi-Arid Regions

These extend north and east of the Caspian Sea and across Soviet Central Asia. The development of drought-resistant strains of wheat makes possible a worth-while crop except in unusually dry years. Millet is grown as an 'insurance crop' and alfalfa in rotation with sugar beets in irrigated areas. The pastoral industry is, however, the most important occupation in these and the desert regions. Cattle and horses are raised where the pasturage permits, and sheep, goats and camels in the drier regions. This was the original home of the caracul and Astrakhan sheep, so much prized as the 'Persian lamb' of the fur trade. The merino sheep has more recently been introduced for its wool.

(iv) The Tropical Regions

In the Crimea wheat, barley and tobacco are the chief crops, but cotton and sub-tropical fruits are plentiful. In the Trans-caucasus, cotton, grapes and citrus fruits are raised, while in the well-watered district east of the Black Sea, tobacco occupies the lower land and tea the hill-slopes. Corn and winter wheat are the chief grain crops, while the cultivation of bamboo is becoming more common.

The Southern Republics have some of the oldest cultivated districts in the world. A very large part of the agriculture is carried on under irrigation in the valleys of the Amu-Darya and Syr-Darya Rivers, and along the Fergana Canal. Over half the cotton crop of the Soviet Union is grown in Uzbekistan. The high yield per acre here has done much to enable the Union to supply its own needs and have some surplus for export. The region around Tashkent raises much rice. Other crops are peaches, apricots, melons, grapes and figs. Silkworms are raised and much experimental work is being done to improve their culture. Several new crops are being grown such as tung oil for paints and varnishes, geraniums for perfume, eucalyptus, camphor, and the cinchona tree, from which quinine is produced. Willows and poplars are grown along the rivers and canals as a regular crop.

Minerals of the Soviet Union.—In so vast a country it is natural to expect great mineral wealth. In a country where great areas are hardly yet explored, much mineral wealth is undoubtedly not yet

known, while much more still waits to be exploited. Except for tin, and possibly pitchblende, the source of radium and uranium, the Soviet Union has supplies of all the most-wanted minerals. It is impossible here to give an account of all these minerals and their location—a good atlas will show what they are, and where they are found. Only those known as 'strategic' will be dealt with.

Coal, the most important of the fuels, exists in large quantities and is widely distributed. The most important deposits are in the Donetz Basin, the Urals, the Moscow region and the Pechora Basin in Europe; the Kuznetzk Basin, the Karaganda region north-west of Lake Balkhash, the Irkutsk region west of Lake Baikal, the Kolyma Basin in the far north-east and the enormous Tungus and Lena fields in Siberia. Much of this coal is of poor quality which will not stand long hauls by train or boat. In such a case the industries are brought to the coal-field, or the coal is used to develop electricity which can be more cheaply transported. Where the coal is particularly poor, a process known as 'gasification' is used. A tunnel is dug underground, the coal is ignited, a blast of air is forced down one end of the tunnel, and the heated gases are driven out the other end where they are used to develop electricity. The by-products are used for various chemicals and dyes. Peat, particularly in the north European plain, is used not only as fuel, but to produce electricity for industrial purposes.

Oil is not as plentiful as coal, and is restricted in distribution. The most important fields are in the Caucasus region, where wells near Baku produce about one-half the total output of the nation, while the Maikop, Grozny and Baku fields together account for about three-quarters of the nation's output. This fact and the destruction the wells suffered during the second World War explain why the Soviet Union is interested in gaining oil concessions in neighbouring countries, such as Rumania and Iran.

Oil fields of lesser importance are being worked west of the Urals, north and east of the Caspian Sea, in the Fergana district of Soviet Central Asia, on the Kamchatka Peninsula and Sakhalin Island.

Where oil is not available, gasoline is manufactured from coal, while in the Volga Region oil shales serve as the chief basis for electrical power.

Iron is widely distributed in the Union. The chief deposits are in the Tula region near Moscow, at Krivoi Rog in the Ukraine, in the Urals, in the Kerch Peninsula of the Crimea, in the southern part of the Kuznetsk Basin, to the east of Lake Baikal and in the Far East.

The largest supplies of manganese in the world lie within the Soviet Union, chiefly at Nikopol in the Ukraine, and in the Caucasus and the Urals. The Union leads the world also in the production of chromium, and is second to Canada in asbestos. Nickel is mined in the Kola Peninsula and at Norilsk on the lower Yenisei. There are supplies of mercury, copper, lead and zinc. The Soviet Union has large supplies of phosphates, so necessary for fertilizers, and supplies of low-grade bauxite for aluminum. Gold is plentiful, and production is second only to that of South Africa.

Transportation.—Before we examine the distribution of industry in the Soviet Union, we must discover the conditions of transportation. The transportation system is, up to the present at any rate, one of the weakest points in the Soviet economy, and this in spite of great expansion during the last quarter of a century. The reasons for this are various, and only a few can be cited here. The difficulties of river transport have already been mentioned. Any Canadian, knowing anything about his own national railway problems, can appreciate the difficulties due to vast distances, and long stretches through country which can never be anything but sparsely inhabited. To these must be added several others peculiar to the Soviet Union. During the second World War the majority of the railway lines in Soviet Europe were disrupted, and the greater part of the existing rolling stock destroyed. This has meant that the railway system is even more overburdened and inadequate than before the war. Moreover the Soviet railways use the wide guage (5 ft. 4 ins. between the rails), so that freight cars from the Union cannot circulate in countries of Western Europe. While this aids in guarding the country's frontiers it has various disadvantages. In the whole of Soviet Asia, due to the barriers of mountains and deserts, only four railway lines cross the border: one into Turkey, one into Iran and two into China. Thus the whole Soviet railway system, while improving and expanding constantly, does not in any sense compare favourably with that in America.

The Soviet road system also leaves much to be desired, and only the trunk roads are hard surfaced. This is partly due to the lack of materials necessary for road building. It is difficult for most Canadians to conceive of a level stretch of country where it is possible to travel for endless miles without finding a stone big enough to throw at a bird. In the grassy plains of the Ukraine and Soviet Central Asia, as in the Pampas of Argentina, this is

the prevalent condition. Such a condition leads to clinging mud, spring and fall, and clouds of dust in summer.

The picture of transportation by air is much brighter. A network of air lines extends over most of the country, and to many of the isolated, and therefore primitive peoples, of the tundra and the desert, the aeroplane is a familiar sight. In these inaccessible regions, as in northern Canada, the aeroplane brings machinery, food and other supplies to mining and manufacturing communities, without which they could not exist. In these same isolated communities, as in northern Canada and northern and central Australia, the radio-telephone is in common use.

Coastwise transportation in the Soviet Union is as little used as it is in Canada. Only dire necessity makes it feasible to ship goods from Black Sea ports, to ports along the north Pacific coast. A very successful attempt is however being made to ship goods by the 'northern route' from Murmansk, Archangel, or the Baltic ports to Vladivostok and the other Pacific ports. A combined use of ice-breakers, aeroplanes and radio reports from the many Arctic meteorological stations, has alone made this possible. Ship-building is being pushed in the Soviet Union, both for commercial and military purposes.

Manufacturing.—The development of manufacturing is that



Courtesy Sovfoto

The Zim, a Soviet automobile. is shown at the end of the assembly line.

feature of the Soviet economy to which every Russian points with pride, and justly so; the expansion within the last quarter of a century has been remarkable. The greatest concentration of manufacturing has always been in Soviet Europe, but even before the second World War a movement into Asia was taking place. The war, which destroyed so many of the western centres of manufacturing, hastened this movement. It will be quite impossible to go into the details of Soviet industry, but it is worthwhile to get some idea of the general pattern of manufacturing and the outstanding industrialized sections of the country.

The location of an industrial development depends in general upon several factors; the presence of large enough quantities of a natural resource to make its exploitation worthwhile, the presence of sufficient power to turn the wheels of industry, an accessible market for finished products, and a transportation network capable of moving in raw products and moving out the finished goods. Where the transportation system is weak, as it is in many parts of the Soviet Union, manufacturing involving heavy or bulky raw products must be carried on near the source of the raw product, while industries involving what is usually called 'consumer goods' are located in centres of dense population. To illustrate, pig iron and steel are manufactured where iron is mined, as at Magnitogorsk in the southern Urals, while machine tools using this steel can be manufactured in Moscow, Leningrad and Gorgy. Again textile mills using raw cotton, wool and silk are placed in Tashkent and other centres of the Southern Republics where these raw produced, while clothing made from these textiles is manufactured in cities like Moscow, Kiev, Stalingrad, Smolensk in the Urals, and Novosibirsk in the growing Kuznetsk Region. Other industries, like the manufacture of aluminum, must be placed where there are enormous amounts of cheap power, rather than near the bauxite from which it is derived. Thus the first of the various aluminum plants in the Soviet Union was built near the Volkhov hydro-electric station, and the second near the great power station on the Dneiper, although both used bauxite from the Tikhvin deposits east of Leningrad. In each industrial region an effort is made to manufacture on the spot all by-products of the main industry and provide as many of the required 'consumer goods' as possible.

The chief manufacturing regions of the Soviet Union are: the Ukraine, the Moscow district, the Urals, the Kuznetsk Basin, and the Tashkent region.

(i) The Ukraine

Manufacturing is here founded on the coal of the Donetz Basin, the hydro-electric power from the Dneiper dam, iron from Krivoi Rog, manganese from Nikopol, as well as the many agricultural products of this region of intensive cultivation. Hence we find iron and steel works, chemical works, which also manufacture fertilizers, aluminum works, factories making agricultural machinery, machine tools, tractors, ball bearings, locomotives and rolling stock, mining and electrical equipment, flour mills, and textile works using both cotton and hemp. At Nikolayev on the Black Sea there are important ship-building yards. The chief iron deposits of the Ukraine are found in the region of Dniepropetrovsk and the town of the same name is one of the greatest Ukrainian centres for iron working.

(ii) The Moscow District

Here the coal is of a inferior quality, but is used for making electricity. The Tula iron district is nearby and a network of roads, rail, and water routes gives access to goods from any part of the Union or abroad. Since Moscow is the Soviet capital, a very large number of government officials swells the population and the market for manufactured goods. For all these reasons Moscow has far outstripped Leningrad in size and in importance, and ranks as the second city of Europe.



Courtesy Sovfoto

NEVSKY PROSPECT.
A main street in Leningrad.

The textile industry, using both wool and linen, was the first to be established in this region. It is still one of the most important. There are also factories making clothing, knitted goods and footwear, printing and publishing establishments, various bakeries and food processing plants. A huge 'meat combine' not only looks after the slaughtering of the animals and the dressing of the carcases, but uses all the various by-products of the meat industry. Some iron and steel are produced and used in the manufacture of aeroplanes, machine tools and automobiles. There are also important chemical works.

(iii) The Urals

It is said that the Ural Mountains have the greatest mineral wealth of any area of similar size in the world. Iron is the most important of these minerals. There are whole mountains of high-grade ore. One of these supplies the ore for the great iron and steel works of Magnitogorsk. Coal is supplied from the western slopes of the mountains and from the Karaganda and Kuznetsk fields in the east. Oil comes in from the western fields near Perm and from the Emba district to the east.

Naturally the iron and steel industry and the manufactures of iron and steel, machines of various types, locomotives, and machine tools, come first in importance, with chemical works using the by-products. Copper is mined and refined and used in the manufacture of electrical equipment. Pulp-wood from the northern forests is processed into paper and cellulose. Wheat from the steppes is made into flour. The flocks and herds from the arid regions to the south-east supply a huge 'meat combine', with its various subsidiary industries. Supplies of phosphates give rise to the manufacture of fertilizers.

There are a number of cities throughout the region. Magnitogorsk at the south, until recently a tiny village, has now a population of over 200,000. Chelyabinsk and Sverdlovsk farther north, where the two trunk railway lines cross the mountains, had roughly a quarter and a half a million population respectively, in 1939.

(iv) The Kuznetsk Basin

This is one of the newer of the industrial areas, and is based on the coal of the Kuznetsk and Karaganda mines, iron from the southern Urals, copper from Minusinsk, lumber from the northern forests, and agricultural and pastoral products from the south.

Most of the chief cities are found where the Trans-Siberian Railway, or one of its branches, crosses one of the north-flowing rivers. Thus we have Omsk and Semipalatinsk on the Irtish River, Novosibirsk on the Ob and Krasnoyarsk on the Yenessei. These cities serve as focal points to which the raw products of Siberia come and from which the manufactured articles are shipped out.

(v) The Tashkent Region

This is one of the oldest cultivated regions of the Soviet Union, with the three ancient cities of Tashkent, Bokhara and Samarkand. Cottage industries, using the agricultural and pastoral products of the irrigated lands, have existed for ages, making carpets, metalwork, leather goods and pottery. Today these ancient cities have streets of modern buildings while factories produce cotton, silk and wool textiles, as well as various articles made from these. Oil from the Fergana Valley and the Bokhara district is refined and used for power. Hydro-electric power is abundant and is used for the manufacture of fertilizer from the nitrogen in the air. Sugar is refined, the many fruits of this region are canned, and textile and agricultural machinery is manufactured.

Regions of Minor Importance.—Some of these are: the Kola Peninsula in northern Europe, where the industry is based on the mining of phosphates, nickel, copper, iron and mica; the Caucasus, so rich in oil, with supplies of copper and manganese, in addition to many agricultural products; the Lake Baikal region with its supplies of coal and iron which are turning Irkutsk and Alma Ata into busy industrial cities; lastly, the regions in the far east around Vladivostok in the south, and Khabarovsk and Komsomolsk on the Amur River.

To compare the production of the Soviet Union with that of other nations is difficult, since the Soviet Government has for years withheld all production figures. There would seem to be no reason why the nation should not at some future time lead the world in both agriculture and manufacturing. However, that time has not yet arrived, and in both agriculture and industry the average per capita production per hour lags far behind that in both the United States and Great Britain.

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ASIA – GENERAL GEOGRAPHY

Post-war Asia.—During the war the general economy of Asia did not greatly change except in those regions such as Japan and the islands of the Pacific which were right in the theatre of war. But certain inevitable processes were speeded up. The Republics of India, Burma, and Indonesia, and the Dominions of Pakistan and Ceyon came into existence sooner than expected. China is still suffering from the ravages of civil war, but this has been intermittent since the turn of the century. The foreigners previously in a favoured position seem to have lost their foothold there, though others may have replaced them. A Peace Treaty was signed with Japan in 1951. On the same day the Japanese Diet signed a Security Treaty with the United States. The country should soon regain her pre-war productive capacity, though it is doubtful whether Japanese foreign trade will reach the figure it once did for some time to come. The new state of Israel has come into being, but other Near East states continue much as before. About Siberia, we know little owing to the strict censorship enforced since the war.

Throughout Asia there seems to be a stirring or awakening—possibly indicating greater changes to come. The big problem is to provide sufficient food for the teeming millions of these countries. The basic Asiatic occupation is farming and the land is tilled much in the same way it has been for centuries. Labour is cheap, a few cents per day, and the holdings are too small to make modern large scale farming methods practical. Industrialization is proceeding slowly, and most goods, except in Japan, are the product of cottage industries.

Education is the great need of most of the people of Asia, but there are so many of them, it is difficult to see how it will be financially possible to make rapid progress in this direction. But with the aid of other peoples and organizations such as U.N.E.S.C.O. much can be achieved.

We owe much to the people of Asia. The beauty of their art work, their rugs, their pottery, their exquisite carvings, all are a

tribute to their craftsmanship and their patience. The philosophy of their great teachers and their poets has its place in our teachings. Even the mistakes they have made have given the benefit of their experience, at great cost to them but at no cost to us. In return we should look upon their problems with sympathy and understanding and do whatever lies in our power to aid in their solution.

PHYSICAL DIVISIONS

Asia has an area of over 17,000,000 square miles, or about one-third of the total land area of the globe. It is 5,900 miles in length and 5,030 miles in width (north to south). It is bordered on the north, east, and south by oceans, on the west by the land mass of Europe and the continent of Africa. Asia is so large that it encircles nearly half the globe, and at East Cape it approaches to within thirty-eight miles of North America. This great continent is centrally located in regard to the other continents, South America being the only one which may be considered far away. Some day the people of southern Asia may awaken to the wonderful opportunities of their geographical position.

It is difficult to divide Asia into a few clear-cut natural regions. However, the following five subdivisions of the continent will give a summary of its structure:

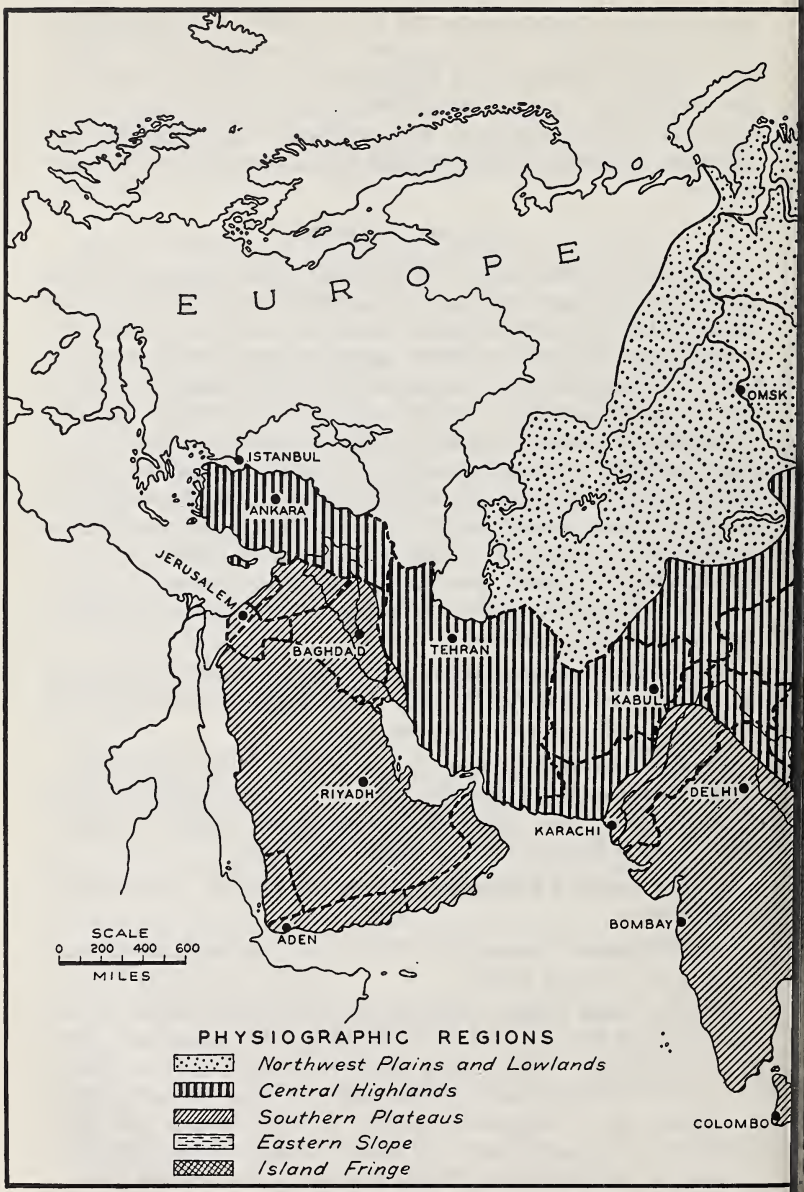
(1) **The north-western plains and lowlands,** which stretch from the Caspian Sea to the Arctic Ocean and are bounded on the west by the low ridge of the Ural mountains.

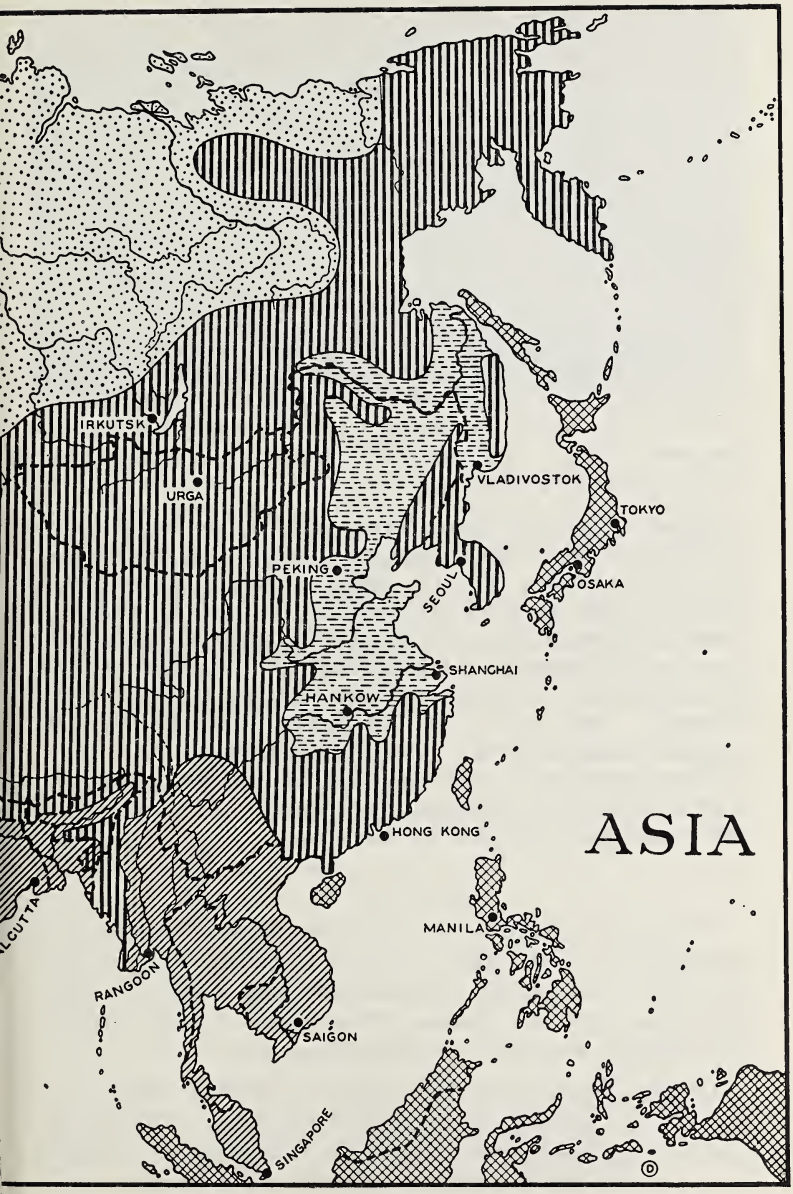
(2) **The central highlands,** which extend from Asia Minor, south-easterly to the Pamir knot and thence north-easterly to the shores of Bering Sea. From the Pamirs, a great range, the Himalayas, extends in a wide sweep to east and south.

(3) **The southern plateaus** of Arabia, the Deccan, Yunnan, and Indo-China.

(4) **The eastern slope,** which is drained by the Amur, the Hwang Ho, and the Yangtze Rivers.

(5) **The island fringe.**—This is the true eastern border of the continent and may be traced on the map from Kamchatka peninsula to Borneo. Throughout this border-rim there are active and extinct volcanoes and the whole area is subject to earthquakes. A similar line of weakness extends through Alaska and from California to Cape Horn. The island border of Asia forms a number of enclosed seas. These occupy basins formed by the subsidence of old portions of the continent.


EUROPE
OMSK
ISTANBUL
ANKARA
JERUSALEM
BAGHDAD
TEHRAN
KABUL
RIYADH
DELHI
KARACHI
BOMBAY
ADEN
COLOMBO
SCALE
0 200 400 600
MILES
PHYSIOGRAPHIC REGIONS
Northwest Plains and Lowlands
Central Highlands
Southern Plateaus
Eastern Slope
Island Fringe


IRKUTSK
URGA
VLADIVOSTOK
TOKYO
PEKING
SEOUL
OSAKA
SHANGHAI
HANKOW
HONG KONG
ASIA
MANILA
RANGOON
SAIGON
SINGAPORE

26

EAST ASIA

China, Japan, Formosa, Korea

The Chinese Republic

Chung-Hua Min-Kuo, Republic of China, became a republic on 12th February, 1912. The Chinese lands embrace an area larger than that of Europe, and have an estimated population of 462,800,000. Stating this another way, the Chinese people occupy one-twelfth of the land surface of the globe, and comprise one-fifth of the world's inhabitants.

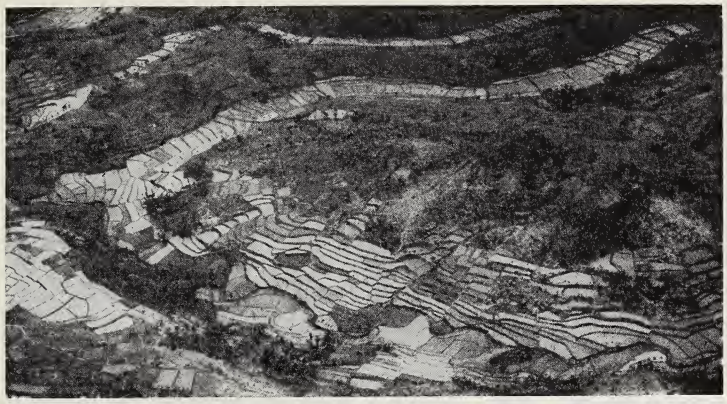
Relief.—From the mountain knot of the Pamirs, the Himalaya Mountains extend south-eastwards in a great arc, effectually shutting off the Chinese from the Indian civilization of the Ganges plain. The Tien Shan and Altai ranges, extending to the north-east, slope steeply to the plains of Central Asia and Siberia. Within this great angle of mountain ranges we find the high plateau of Tibet, the high plains of Sinkiang, the Gobi desert, and the plateau of Mongolia. These account for two-thirds of the total area of the republic, but have less than 2% of the population.

The plateau lands descend to a plain which slopes gently to the Pacific. This is China proper. From the standpoint of population this is the largest political unit in the world.

China Proper

The plain is crossed by three important rivers, the Hwang Ho, Yangtze Kiang, and Si Kiang, which take their rise in the western highlands. Mountain ridges of moderate height form a water-parting between the river basins. For purposes of administration, China proper is divided into eighteen provinces.

Climate.—Since the Chinese plain lies between latitudes 22° and 42° N., we may expect marked differences in the climate. North China, including the basin of the Hwang Ho, has a climate of extremes, with freezing winter weather and hot summers. Winds



Courtesy Triangle Photo Service

Flooded rice paddies in Szechuan Province, China.

blow from the cold, dry interior of the continent during the winter months and the lakes and streams of Pechili Province freeze over. Central China, or the valley of the Yangtze Kiang, has milder winters, but light falls of snow and the formation of thin ice on the ponds are common. South China is tropical, and the valley of the Si Kiang is seldom threatened with frost. These remarks apply to the lowlands. Everywhere in China, the mountains are snow-capped in winter, and the melting snow in spring causes the rivers to flood, sometimes with great loss of life and destruction of property.

China lies within the monsoon belt. The rains come in summer, as the south-east winds blow in from the sea to take the place of the heated air over the interior of the continent. There is little precipitation during the winter months and the snowfall is light. Southern China receives from sixty to eighty inches of rain each year; the Yangtze valley has between forty and sixty inches, while North China must be content with from twenty to thirty inches.

The Hwang Ho basin.—The river, 2,600 miles in length, rises in the Tibetan highlands. It then flows through a fertile loess plateau, and across the Great Plain of China to enter the Gulf of Pechili north of the Shantung peninsula. The loess plateau consists of a fine yellowish earth which is very fertile. In some places the deposit is two thousand feet in thickness and only the tops of the higher hills protrude through this yellow mantle. The Hwang Ho and its tributary streams have cut their way down to hard rock, often leaving vertical yellow walls of loess hundreds of feet

high, in the sides of which the Chinese have hewn out their homes. Roads from one village to the next are deeply sunk in the soil, and one will find these side walls dug into for dwelling purposes. Such homes are easily made, and there is little alternative in a country devoid of trees and rock. There is the further advantage that a dug-out home is cool in summer and warm and dry in winter. Wheat is the staple crop of the loess country. Although the loess soil is of wonderful richness it is porous and needs plenty of rainfall. The varying amount of precipitation which this region receives from year to year makes it impossible to depend on good crops, and the loess country with its millions is not as densely populated as is the Great Plain of the lower part of the Hwang Ho.

Yet even this population, which subsists largely by means of agriculture, presses heavily on the land. Wherever possible two crops a year are grown. Wheat or barley is planted in the fall and harvested in the early summer. Immediately the soil is prepared for small plots of peas, beans, corn, millet, and sweet potatoes.

The farms are of small size and there are few draught animals. A Chinese farmer in the loess district may own four or five acres. There is little produce left over for export or sale. The needs of the people are few; implements are simple and often hand-made. Transportation is by means of primitive dirt-roads, and the district is largely self-contained. There is little margin of sustenance, so that a year of light rainfall means want and starvation for thousands of the loess dwellers. There are no large cities.

The Great Plain.—This is one of the richest agricultural regions in the world. It is roughly six hundred miles in length by three hundred miles in width and covers an area equal to that of France. It supports a population of approximately 120,000,000 people.

Throughout this plain the rainfall is more certain and there is less danger of a bad year. But gains from these advantages are somewhat marred by the vagaries of the great river—the Hwang Ho. Flowing down from the loess basin, the river-water is yellow and thick with silt. There is a very gentle slope to the plain and, as the stream slows down, the silt is deposited. The result is that the bed of the river is continually rising. Embankments of earth and straw matting are laboriously maintained until in places the river is well above the surrounding plain. When a flood of water comes down it may make a breach in the retaining walls and inundate thousands of acres, causing much suffering and destruction of property. Silt is deposited in Pechili Gulf to such an extent that land is being formed at the rate of one hundred feet a year. The



Courtesy Eastfoto

Workers building the Shih Man Tan Reservoir, a part of the Huai River Anti-Flood project.

lower course of the Hwang Ho is shallow and obstructed by shifting sand-bars so that it is practically useless for large vessels. This is a serious drawback to the trade of the whole region. The Hwang Ho has been well named 'China's Sorrow'.

Agriculture on the Great Plains has been carried to the last degree of perfection. Every square rod of ground which can produce feed is made to do so. Wheat, millet, corn, peas, soya beans, sweet potatoes, and rice are staple food crops. The people are largely vegetarians because the soil can be made to produce more by cultivation than when left in pasture. The family cow or ox is for draught purposes and is fed on a sparse diet of straw and vegetables. The family pig eats what is left. The Chinese eat little meat and use the soya bean oil as a fat. When the pig is killed there is feasting, since it supplies another form of fat to a diet somewhat deficient in this regard.

Cotton is grown to some extent through the southern part of the Great Plain, and everywhere the peasantry have hand-looms for weaving their own clothing. Wool is secured from Mongolia and from the coarse-fibred native sheep. Padded cotton garments are used throughout the Great Plain, where the winter's cold is sometimes keen and piercing.

Shantung peninsula is a rugged mass of mountains rising from the alluvium of the Great Plain. The mountains have been denuded of their natural forest cover until now they are almost bare rock. Soil erosion has made it impossible for tree growth to appear again on these gaunt rock-ribs. In fact this situation is

common through China proper. For thousands of years there has been a dense population on the fertile plains. Wood was needed for fuel and for charcoal which the village smiths use in performing their handicraft. It is evident that the forests were recklessly used with no thought of the future. As a result, when heavy rains occur, there is a rapid run-off, and the rivers flood, causing great misery among the people of the plains.

The valleys of Shantung almost make up for the bareness of the hills. The food products are those of the Great Plain. In addition, peanuts are grown and used extensively for their oil and fat content. Thousands of tons are exported to America. It is estimated that Shantung Province produces four-fifths of the Chinese supply of ground-nuts. Cotton is cultivated and many villagers work at spinning and weaving in their cottages. Silkworm culture is widespread and there is a large manufacture and export of pongee silk. There are modern cotton mills at Tsingtau, and Chefoo is noted for its silk trade.

The mineral wealth of the Hwang Ho valley is known to be of great potential value. It has hardly been touched as yet. Great beds of coal are found outcropping in Shansi and both modern and primitive mines are in operation. The largest producing field at present is at Kaiping, seventy-five miles north-east of Tientsin. Coal is also mined from the Ishan Range of Shantung peninsula.

Iron, copper, and gold are found in the mountains of Shantung.

Tientsin, situated on the Pei Ho, is the chief manufacturing centre of the northern end of the Great Plain. Taku, at the mouth of the river, is the seaport of this district, though the Pei Ho has been deepened so that steamers may now proceed up to Tientsin. The city owes its importance to the number of streams which flow through the plain and converge at this point. These are navigable for small vessels and bring the products of the plain to Tientsin. Tientsin is also at the northern end of the Grand Canal, which extends southwards across the plain seven hundred miles to Hangchow, south of the Yangtze Kiang. Large cotton factories at Tientsin draw their raw material from the growers on the plain. Among other industries of this busy centre may be mentioned large dye works and distilleries.

Peiping (or **Peking**), long the capital of the Chinese Empire, fell from its high estate in 1928, when the government moved to Nanking. It was built originally as an outpost against incursions of the nomads from the north. The situation of Peiping on a dry plain between the Hun Ho and Pei Ho leaves it isolated from the



Courtesy Triangle Photo Service

A public letter writer in the streets of Peiping.

more productive river bottoms. Peiping is a trading centre, but following the transfer of the government there was a period of gradual decline of trade. But with the establishment of the Peoples' Republic in Continental China by the recent civil war, the capital has been returned to Peiping. A rail route leads to Kalgan, an old city situated at the base of the Mongolian plateau and a centre of the caravan trade to north and west.

Peiping is also connected by rail with Hankow on the Yangtze. This is an important rail line, skirting as it does the western edge of the Great Plain. There are several branch lines, the most important running westwards to the coal- and iron-fields of Shansi.

A third rail line runs south along the eastern margin of the plain from Tientsin to Pukow on the Yangtze opposite Nanking.

The Yangtze Kiang basin is the largest of its kind in eastern Asia. It is 3,200 miles in length and drains an area of 690,000 square miles. The population is estimated at 184,000,000.

The Yangtze, or Blue River of China, is navigable to Ichang, 1,050 miles from the sea. Large ocean steamers ascend the river to Hankow, 600 miles up stream. Beyond this city smaller river steamers carry articles of trade to Ichang.

The Yangtze rises in the plateau of Tibet, almost due north of Calcutta. It descends to the sea by a series of four steps. Throughout its upper course the river is deeply sunk in the steep-walled valley cut into the plateau. This part of the descent is rapid and the stream falls some 15,000 feet, tearing through its great gorge

into the Tungting Lake plain. Several important tributary streams drain this area into the parent river.

Below Hankow the Yangtze drops a bare inch for every mile of its course and there is little current. A third depression is seen in the Poyang Lake area. There is a low delta plain built up within recent ages by the alluvium brought down by both the Yangtze Kiang and Hwang Ho. The Hwang Ho once flowed into the sea south of the Shantung peninsula.

The Yangtze basin is a very densely populated part of China. More people live in this river valley and along its tributary streams than are to be found in the whole continent of North America. Primitive methods of agriculture and of manufacture still dominate the dwellers of the Yantze basin, and the machine age has made little progress there as yet. However, if the Chinese ever decide to adopt the methods of European manufacture, trade, and commerce, we shall see them spread first throughout this great river basin. The Yangtze is China's chief highway into the heart of the continent.

The lower Yangtze lands are only a few feet above sea-level. In Kiangsu province small canals criss-cross the land in every direction. Dykes and ditches are common, many parts resembling Holland. This is the great rice-growing area of China. Mulberry trees are planted along the embankments and silk culture is next in importance. Tea is grown on the higher lands sloping upwards to the mountain ranges; it is also grown throughout the middle Yangtze valley in Hupeh and Hunan provinces.

The climate of the lower and middle Yangtze basin, with its mild winter season and long, hot summer, produces a sub-tropical vegetation not found in the Hwang Ho basin. The rainfall is heavier and is well distributed throughout the summer and into the fall. This is seen in the different type of trees common to the Yangtze valley. Here we find the banyan, the camphor tree, the mulberry, and even the bamboo growing. Sugar-cane and cotton are also grown. On the better drained slopes grains such as wheat and maize are important crops. Animals are comparatively few in number and the larger part of the work is done by hand. The Tungting and Poyang lake beds are gardens of fertility and densely populated. These lakes act as reservoirs for the summer flood-waters of the Yangtze. The melting snows of the Tibetan range sometimes cause a rise in the river of as much as seventy feet. The lakes absorb some of the flood-waters and prevent disastrous floods which might otherwise occur in the lower portions of the Yangtze basin.

Shanghai is on a small tributary, the Wusung (or Hwang Po), which flows into the Yangtze estuary. It is the largest city in China and conducts 40% of the export-timber trade.

Large ocean steamers come up to Shanghai and unload. Shanghai is the entry port for goods going up the Yangtze and for a large part of the Hwang valley as well. The seacoast north to Shantung peninsula is low and marshy with no satisfactory harbours, while on Shantung peninsula the various ports are too far from the rich hinterland to control the trade of the middle Hwang valley. Tientsin cannot be reached by vessels drawing more than twenty feet of water, hence Shanghai is, to a large extent. the seaport of central and northern China. However, since the Chinese Civil War, great changes in policy regarding foreign business have come into effect and it is a little early to tell what the full effects will be on Chinese ports and commercial centres.

The business district of Shanghai is quite European in appearance. Wide paved streets, large modern buildings, and an efficient police and sanitary system made it one of the best governed and most prosperous cities in the whole country. Large banking establishments had their headquarters here, and there are vast warehouses to receive import goods and supplies of tea, tung oil, silks, fabrics, and articles of workmanship which the Chinese exported to the outside world. Here one will find foundries, repair shops, graving docks, ship-building plants, machine shops, and engineering works. Nearly all were under European management before the Civil War. Cotton manufacturing is one of the important industries at Shanghai and is carried on in large modern mills.

Nanking, one hundred miles upstream from Shanghai, has a more central location than that of Peiping. There is rail connection north through the Great Plain, and south to Hangchow. There is, of course, the river route into the interior, and trade southwards by the Meiling Pass to the Si Kiang and Canton. There is coal and iron in the neighborhood and it is expected that Nanking will develop into a busy manufacturing centre. Pukow, on the opposite or north bank of the river, is the southern terminus of the railway to Tientsin.

Hangchow, at the head of Hangchow Bay, is the southern terminus of the Grand Canal and is a city of importance, dating back beyond the days of Marco Polo, when it was the capital of China. Hangchow is noted for its manufacture of silk.

Hankow is at the head of navigation for large steamers on the Yangtze. Here goods are loaded into smaller river steamers which

ascend as far as Ichang. There is also direct rail connection north to Peiping, south through the Tungting Lake area, and up the valley of the Hsiang. It is expected that this main line will be continued southwards to Canton. Hankow occupies an unrivalled trade position in central China. So valuable is this spot for trading and manufacturing purposes that we find three cities at the junction of the Han with the Yangtze. Their combined population is estimated to be nearly 1,000,000.

Hanyang is the great smelter town of central China. Large iron- and steel-works, rolling mills, and machine shops are located at this point. Some of the pig iron and even the iron ore itself is exported to Japan. The rest of the material is used to supply the home market.

Ichang is the head of easy navigation on the Yangtze. Beyond this point the river narrows and rushes through a great gorge. For centuries the Chinese have laboriously hauled their laden, square-prowed river junks up this stretch of turbulent water. A well-beaten towpath follows the river bank between the water and the steep-sided mountains. Today, high-powered river launches successfully navigate the gorge and the chanting gangs of four hundred coolie trackers straining on the long cable are almost a thing of the past.

Chunking is the metropolis of the Red Basin of Szechwan province and carries on an extensive trade with all parts of the province. It is the principal import centre for goods coming up from Ichang.

The crops of the upper Yangtze are most varied in their nature. Wheat, maize, tea, cotton, and vegetables are the chief products of the soil. The hill-sides have been terraced, so great is the pressure of population, and cultivation is carried on up to six hundred feet elevation. Szechwan is also noted for its production of silk; vegetable wax, deposited by an insect, is secured from the wax-tree. Coal of fair quality underlies the red sandstone beds and is mined for local use by native methods. The extent of the coal-measures has never been determined, but the reserve is thought to be very great. Iron ore and copper have been found. This great region, rich in minerals and with a fertile soil, remains isolated from the rest of China by the surrounding mountains. It is a state within a state. What trade there is with the outside world must squeeze through the hundred-mile gorge of the Yangtze. The population is so dense that it has reached the point of saturation. Millions of the inhabitants make a bare living and even a partial

crop failure means famine and starvation for many. There are few regions in the world where the people are more self-contained, and where the exports and the imports are so small in relation to the population, as on the upper Yangtze.

Since 1939 a new supply route has been built, known as the Burma Road. It runs from Lashio in Burma to Chungking, a distance of 1,420 miles.

Southern China is drained by the third important river, the Si Kiang or West River. Southern China is mountainous, and the east-west direction of the ranges give an added importance to the Cheling and Meiling passes which lead to the Yangtze valley. The wonder is that China has remained a large political unit for so many centuries. If the European example were followed each of its river basins would form a single state.

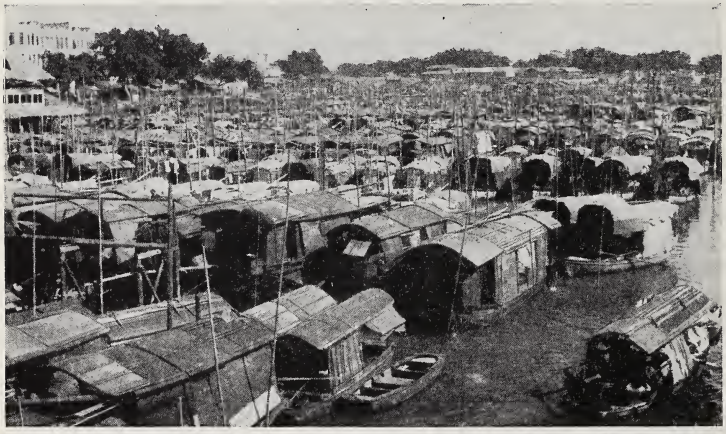
As in the Yangtze valley, there are a series of steps down from the Tibetan plateau in the west. The mountain ranges enclose a high plateau, where the people live by animal husbandry, an occupation which is not common through China proper. The river valleys are deeply cut into the plateau and are thinly peopled owing to the intense heat and unhealthy conditions of moisture and rank-growing vegetation. The growing of tea and of opium is important and the former is of good quality. Silk culture is carried on. The mineral wealth of Yunnan province is noteworthy, even in a land as richly endowed as that of China. Coal outcrops at several points and is mined in a small way by native methods for local trade. Copper, lead, zinc, silver, and iron deposits are known. Tin has been mined on a large scale, but Chinese authorities have discouraged export of the ore. Native methods of extracting the tin are not able to compete with more modern means and the tin mines of Yunnan await future world requirements and industrial modernization.

In the lower areas of the Si Kiang basin the highlands are densely forested. The rain comes chiefly during the summer season. Here we find the bamboo, which is put to so many uses: building houses, making furniture and household utensils, such as dishes, mats, and baskets. Camphor and cinnamon trees are also native to this region. In the lowlands and on terraced hill-sides where irrigation is possible, rice is the staple crop. Maize is grown on a large scale, and in the upland districts are fields of wheat, barley and beans.

The Si Kiang and its tributary streams are the chief highways of trade throughout south China. In these waters are carried goods for export and supplies for the inland population of over fifty

million people. During high-water, fair-sized steamers can ascend as far as Wuchow. The rest of the year transport is carried on by means of motor launches.

The great trade centre is Canton. It is situated on the delta plain formed by the Si Kiang. Here river and valley routes lead northwards to the Yangtze, and eastwards to the fertile lands of Fukien. So crowded are the environs of Canton that several hundred thousand people live on boats in the river. The merchants of Canton have been famous for centuries for their export trade. It was once a great tea port, but this trade has sadly declined in



Courtesy Eastfoto

Sampans along the Pearl River front at Canton. These boats are the only homes of many Chinese.

recent years owing to competition with India and Ceylon, and with the more carefully prepared product from the Yangtze valley. Manufactures of cotton and silk fabrics are important. There is also a large trade in matting, tobacco, leather goods, fireworks, and articles of curious workmanship made from jade, ivory, sandalwood, or teakwood.

So important is the trade of this region that three European countries have secured valuable concessions at the mouth of the Canton River or estuary which extends inland to Canton, a matter of ninety miles. France has control of Kwanchow Wan. Portugal has had the concession of Macao for several hundred years, while Britain has had the island of Hong Kong since 1842, and the peninsula of Kowloon since 1860. Hong Kong is today the leading foreign commercial centre of south China, and bears some re-

semblance to Shanghai near the mouth of the Yangtze. The island itself is of small area and mountainous. The city of Victoria is situated at the base of a steep, rocky mountain and the harbour is formed by the strait between the island and the mainland. This is one of the great commercial ports of the world. It is a collecting and distributing centre for the whole coast of China south of the Yangtze mouth. Since large steamers cannot ascend the Canton River beyond Whampoa, twelve miles below Canton, a large part of the trade goods destined for the Si Kiang valley is first landed at Hong Kong. Industries such as shipbuilding and ship repair, sugar-refining, and tobacco manufacturing are located at Hong Kong. It is the base of the British China Squadron, a coaling station of importance, and always maintains on hand a large quantity of naval stores. Thousands of Chinese have moved into Hong Kong and to Kowloon, and conduct their business under the British flag where conditions have been more secure.

The area between the mouth of the Yangtze and the rivers draining south-west to the Si Kiang has a mild winter climate and hot summers with monsoon rains. Rice is the staple crop. Tea is grown extensively and large quantities are exported. Silk culture is important. Cotton of good quality is grown and there is a large native manufacture. Camphor-oil is distilled from the wood of the camphor tree which grows wild in this part of China. Reckless cutting of the trees and no replanting have caused a serious decline in the output of this valuable oil.

Hangchow is the large commercial centre of this area. Ningpo, near the southern entrance to Hangchow Bay, is another large centre of industry. Foochow and Amoy are large cities. Both are situated at or near the mouths of streams flowing down from the interior. Amoy has an excellent harbour and is developing an import-export trade with its hinterland.

Summary.—In the preceding pages we have described the largest single group of people that exists anywhere in the world. A remarkable characteristic of the Chinese is the similarity of type throughout the lands of China proper. The Chinese of the northern part are a strong, tall race, while those of the south are shorter in stature, but there is no mistaking the fact that they are all Chinese. While it is true that there are a number of dialects spoken in different districts, yet if one knows the official Mandarin tongue he may carry on business in almost any province of the country. The differences in race and in language are not nearly as marked as they are in India. This solidarity of Chinese

life is the more remarkable when we consider the build of the country and that the three great river basins are separated from one another by mountain ranges and that there are only a few natural trade routes from one valley to the next.

We may find an explanation in the fact that China proper has been protected from invasion on the north by the desert of Gobi and the waste lands of Mongolia, and on the west by the high, arid, thinly peopled plateau of Tibet. Within this natural fortress, the Chinese people have multiplied throughout the centuries. They have spread from their original centre on the Wei Ho in Shensi to the Yangtze and to the Si Kiang valleys. This must have taken thousands of years. Then, when they had become rich in the goods of this world and an envy to the less favoured people of Mongolia, they built the Great Wall to protect still further their northern frontier. The wall stands today a monument to their desire to live by themselves and to keep out the foreigner. This very exclusion has bred a suspicion of all foreigners and has hindered advancement during the last few hundred years.

China has three religions: Buddhism, which came in from the Ganges; Confucianism, and Taoism. These religions do not divide the Chinese into hostile sects since many adopt parts of all three. The binding tie throughout China is ancestor worship. The burial places of their ancestors are sacred and the old man of the family reigns until he dies. His sons pay deference to his wisdom while he lives and revere him when he has departed. The family is stronger than any government. The Chinese find it difficult to think nationally, and this factor has prevented the formation of a strong central government. The Republic of China, which was formed in 1912, found it hard to exert its authority against the obstacle of ancestor worship. Governments can come and go, the family remains, a present and visible entity. Lack of communication between districts has been another factor hindering the establishment of a strong central government. Local chiefs have been able to obtain strong followers in their respective districts, and for many years there has been internal warfare between jealous and ambitious leaders. As a rule the numbers of their followers have been small in comparison with the population of the province or district. The great mass of the people go about their daily tasks and must often wonder what it is all about. Perhaps the success of the Chinese Communist forces in gaining control of the country will mark the beginning of a more national outlook.

Yet even in China new ideas are slowly penetrating. Some of the provinces have railways, and their use is increasing. New lines

are being built. As the means of communication are improved so will the change to a new order gather momentum. The valley of the Yangtze is open to shipping as far as Hankow. Through this artery of trade the ways and the wares of the western world are making an opening. The Chinese are already buying millions of gallons of kerosene as an illuminant for houses and shops. Machine-made cottons are sold throughout many of the provinces in competition with the article of native manufacture. There are modern blast furnaces at Hankow, and motor boats ascend the Yangtze to Chungking in the heart of the Red Basin. Yet, where the population is so dense that it presses on the land, it might not be wise to carry reforms too far or too quickly. The Chinese has many excellent qualities. He is honest in his dealing, cheerful, industrious, healthy, peace-loving, and a great respecter of education. It is to be hoped that these qualities will be retained as the bedrock of the new China.

MANCHURIA

Manchuria lies south of the Amur River. It possesses some of the finest agricultural land in eastern Asia, comparable to the parklands of Alberta in climate and soil.

Manchuria was, until recently, under the technical control of China. In 1915, however, the Japanese Government assumed virtual control and suppressed banditry. In 1931 the Japanese army occupied Fengtien (Muckden), and by February of 1932 had completed the occupation of Manchuria and of Jêho province as well. Manchuria was proclaimed an independent state by Japan and called Manchukuo. Since World War II, however, this area has been returned to China and the old name of Manchuria restored. Russian influence is now strong there.

The Japanese people had been reluctant to comply with the advice of their leaders to emigrate to Manchuria; the Chinese, on the other hand, had taken advantage of the security provided by a well organized region. It is estimated that 20,000,000 Chinese farmers have moved into Manchuria during the last thirty years.

The whole region has an estimated population of 43,233,000 based largely on agriculture, and most solidly Chinese. The valley of the Sungari River is the most fertile section of the country.

Soya beans, *kaoliang*, millet, wheat, and rice are the principal crops. Coal and iron ore are produced in large quantities, and about 10 per cent of the total area is covered with valuable forests.

Chilin, Harbin, and Chichiharh are large trading centres of the central and northern parts.

Fengtien controls the trade of the plains sloping to the south. Newchwang and Dairen are the chief seaports.

THE OUTLYING LANDS

These consist of the provinces and dependencies of Mongolia, Sinkiang, and Tibet. They have a total area of 2,381,610 square miles and a population of about 6,500,000. Russian influence is strong in all these provinces. Why are these lands so thinly populated while China proper carries such a dense population? The answer is found in a study of the terrain and in the amount of rainfall for any given year. Tibet is a plateau averaging 15,000 feet in height and cut off from adjacent lands by still higher mountain ranges. The Himalaya and Karakoram ranges border it on the south and west, the Kuen Lun on the north, and a number of north-south ranges interfere with easy access to the plains of central China on the east. The people of Tibet live in small villages near streams which have cut their way deeply into the plateau. On the narrow bottom lands and on terraced hill-sides the native inhabitants grow wheat, barley, peas, beans, and other vegetables. Irrigation is used where water is available. On the hill-sides the Tibetan pastures his herds of sheep, goats, and yaks. The yak is the chief beast of burden and also supplies the people with butter and meat, and with clothing made from the hide.

Northern Tibet is inhabited by pastoral tribes; it is thinly peopled and there is little trade or contact with the rest of Asia.

Lhasa, the capital, is situated on a tributary of the Brahmaputra. It is the home of the Dalai Lama, who is the chief arbiter of the Buddhist religion. The 'Forbidden City' was forcibly entered by a British armed force in 1904. At that time treaties relating to trade were agreed upon and the Indian-Tibetan frontier was opened. The chief article of import into Tibet is brick-tea, which is carried in on the backs of coolies by way of trails over the mountain ridges. Because of their isolation, the Tibetans have developed customs and religious beliefs that seem strange to us. The country is priest-ridden in the extreme, and the peasantry are kept in ignorance and in fear. In 1951, Tibet came under the control of the Chinese People's Republic.

Sinkiang, also known as Chinese Turkestan, is a region of interior drainage. It lies mainly between the Kuen Lun and Tien

Shan ranges. The climate is continental, with cold, dry winters and hot, dry summers. A large part of Sinkiang is desert and the rest is poor steppe land. The Tarim basin is the more fertile part. Here there are oases laboriously irrigated by water from the encircling mountains, where there is a snowfall sufficient to form glaciers.

The trade routes of Sinkiang run along the base of the mountains from oasis to oasis. Some of these river-fed oases are of large extent and walled cities are found, such as Khotan, Yarkand, and Kashgar. Wheat, barley, and rice are grown on these irrigated lands and fruit trees flourish. Cotton is a staple product of the region as in Soviet Central Asia to the west. Sheep, goats, and camels are grazed on the steppe and in the mountain valleys. The bazaars of Kashgar and Yarkand are noted for their native manufacture of carpets, woollen, cotton, and silk goods. From Kashgar, a trade route leads over the Terek pass to Andijan on the Trans-Caspian Railway. Another route strikes south from Yarkand over a pass in the Karakoram Range to Leh in Kashmir. There has been a steady migration of Chinese into Sinkiang during recent years and the region is developing rapidly in importance.



Courtesy Triangle Photo Service

A priest's hut in Inner Mongolia.

Mongolia is a vast territory bounded by Siberia, Manchuria, China proper, and Sinkiang.

It is divided into two political divisions, Outer Mongolia in the north, a republic under Soviet domination, and Inner Mongolia in the south and east, under Chinese control. The Great Gobi desert occupies the central portion of the country and is a region of vast tracts of sand and sparse vegetation. The district to the south and east of the desert is more elevated and terminates in a high mountain range. Here are found well-watered fertile valleys with pine, lime, fir, oak, and walnut trees growing on the slopes.

The native population consists of small bands who live in felt tents and move from place to place in search of fresh pasturage. Sheep, camels, and horses comprise their wealth.

There are a few industrial enterprises in Outer Mongolia where the native workers are trained by Russian technicians. The capital city, Ulan Bator Khoto, formerly the holy city of the Mongols, has been modernized and now has a radio station, high schools, a university and a military school with Soviet advisers.

Foreign trade in this region is carried on exclusively with the Soviet Union.

Japan

Japan was the island empire of the Pacific. In its relation to the eastern coast of Asia it strongly resembled the British Isles and their relation to the western coast of Europe. Both Japan and Britain are separated from the adjacent continents by narrow seas, which serve a variety or purposes. The seas protect the islands from armed invasion yet do not prevent the island inhabitants from interfering in continental disputes and throwing the weight of their power where and when it will be most effective. They make the islanders naval-minded, and seaborne commerce is a natural result. In addition to their own carrying trade, that of other nations is sought, and their ships ply on every sea. A world outlook is encouraged. Raw materials are easily assembled and manufacturing is a main industry. The rise of the island kingdom of Japan to world power, once the doors of exclusion were opened, has been one of the remarkable features of the last eighty years. It is a notable fact that the Japanese, in looking over the modern world of 1870-90, should choose as their model the form of government and the business administration found in the British Isles.

Though the Japanese government was democratic in form it was not democratic in principle, and was in reality a dictatorship of

the Imperial family supported by a strong military clique. After the second World War, Japan was under American military occupation until in 1951, a Peace Treaty was signed between Japan and forty-eight other nations.

The Japanese Empire consists of four large islands, and many smaller islands. By the terms ending the second World War, Japan was forced to surrender her other seized lands, Manuchuria, the southern half of Sakhalin, the Kuriles, Korea, Formosa, the mandated islands of the Pacific, the Marshalls, the Carolines, Ladrones, and the Valus. Greater Japan was reduced from an area of 773,783 square miles to 141,529 square miles. The population decrease was over 100 millions.

The island chain which stretches from Kamchatka Peninsula to Borneo is the remnant of a once great mountain system. The islands are the partially submerged tops of the higher mountains of the system, which is actively volcanic. Earthquakes are common and boiling springs show the presence of great subterranean heat. Many of the mountain peaks are rounded cones, the most symmetrical being Fuji-san on Honshu. There are 165 of these volcanoes in Japan and 54 of them are active. Four rather shallow seas are enclosed by the island chain and four important Asiatic rivers empty into these seas. Japanese ships ply across the seas and into the rivers, seeking trade with the fertile valleys beyond.

CLIMATE

Since Japan extends through nearly thirty degrees of latitude, there are wide variations in the climate of the various islands. Karafuto and Hokkaido have a climate similar to that of Gaspé Peninsula and Newfoundland. The winters are cold, snow covers the ground during the winter months, and people live in strongly built log houses. In summer, along the seacoast, the cold Sakhalin and Lhishima currents keep the temperature down. The inland valleys, however, have hot, dry summers. Central and southern Japan lie in the monsoon area of eastern Asia. During the winter season, September to March, a high-pressure area forms over the Lake Baikal district, and a low-pressure area over the North Pacific. Cold winds, therefore, blow out from Siberia and across the Japanese islands. These winds take up moisture from the Japan Sea and, as the air is forced to rise in its passage eastwards, the central mountain ranges receive a heavy precipitation of snow. Along the Pacific sea-board, in the lee of the mountains, the winter months are blessed with fair weather.

In the summer months, from April to September, the situation is almost reversed. Then the south-east monsoon blows in from the Pacific and there is a fairly heavy rainfall. The rains are heaviest from 10th June to 10th July; this season is known as the 'Bai-u' or 'plum rain', as it occurs when the plums are ripening. The Bai-u comes in the form of a prolonged drizzle rather than in heavy downpours. A maximum of rain occurs again in August and September during the typhoon season. At this time several inches of rain may fall within a few hours, the rivers overflow, and the lowlands are inundated. Cyclonic storms also bring summer rains to the west, or Japan Sea, coast of the the islands, and here the total yearly precipitation is very heavy. In fact, the average number of wet days on the west coast of Japan runs as high as 225 out of 365. Tokyo, on the east coast of Honshu, has an average of 146 wet days each year.

The climate of central Japan (Honshu, Kyushu, and Shikoku) is also affected by the warm Kuro Siwo or Black Current, which moves slowly up the coast from the equatorial region. This current divides south of Kyushu. The weaker branch enters the Japan Sea by the Tsushima Strait and follows the Japanese coast as far as Karafuto. The eastern, or stronger branch follows the southern side of the main islands to about latitude 38° N., where it gradually flows eastwards into the North Pacific. The Tsushima current keeps the western coast of Japan warmer than it would otherwise be in winter, and the strong Black Current is probably a factor in adding to the amount of summer rain along the eastern slopes. The cold Chishima current which flows from the north along the Kurile Islands, Hokkaido, and the Honshu coast to about 39°N. gives a comparatively cool summer temperature to the eastern coasts of these islands.

A rainfall of from fifty to eighty inches per annum, and a moderate climate made possible a great forest which once covered these islands. The plains and valleys suitable for agriculture have long been cleared of their trees, but the mountains are still well timbered. In this respect Japan differs greatly from many parts of China. The government of Japan has made very definite regulations regarding the cutting of timber and re-forestation. For some years, the annual cut from the home forests has not been sufficient to supply local needs; the deficiency has been wisely filled by importation of timber from abroad.

Hokkaido and the northern part of Honshu present a type of cool, temperate forest where pine, fir, cypress, beech, ash, and walnut are found. South of Tokyo these trees occur at increasingly

higher altitudes. Over the rest of Japan proper, the vegetation changes gradually to that of the sub-tropical rain-forest type. Here the camphor raises its stately column, and we find oak, pine, and boxwood. Bamboo groves are common.

Let us now examine the several parts which made up the former Empire of Japan.

KARAFUTO

Karafuto, the southern part of Sakhalin (Saghelien) Island, was acquired from Russia in 1905 by the Treaty of Portsmouth. Karafuto is almost as large as Vancouver Island and in 1938 had a population of about 340,000, almost entirely Japanese. Fishing is the important industry. Herring, mostly made into fertilizer, trout, cod, salmon, and crabs are the principal species. Forests cover about six million acres, and there are a number of pulp mills. Coal-beds have been opened and coal is exported. Oil-wells have been bored along the western coast.

About one-fifth of the inhabitants of Karafuto are engaged in agriculture. Oats, rye, potatoes, turnips, and cabbages are grown, and vine-yards are being planted. Nearly a million acres of land are suitable for pasturage. However, the Japanese peasant is not accustomed to the rearing of cattle and eats little meat. The temperature drops below zero in January and the hot days of July and August reach 90° F., a range of 110° F.

In 1945, Karafuto was returned to the U.S.S.R.

JAPAN PROPER

Hokkaido is a little larger than New Brunswick. It is a mass of mountain ridges. In many respects Hokkaido resembles the coast district of British Columbia, where mining, lumbering, and fishing are the chief industries of the people. The forests of Hokkaido supply each year a cut of about 3,600,000,000 board feet from coniferous and deciduous trees. Pulp mills are an important factor in the utilization of the island's timber production. Japan manufactures 570,000 tons of pulp-wood and imports an additional 70,000 tons.

Coal-seams are worked at Yubari and coal is exported from Muroran.

The fisheries of the waters adjacent to Hokkaido are the most important in Japan and give employment to thousands of people. Herring, sardines, cod, and salmon are the principal fish caught. Whaling is carried on along the Kurile Islands.

The agricultural development of Hokkaido is linked up with the lumbering and fishing industries. Owing to the colder nature of the climate very little rice is grown. Stock-raising and mixed farming, as in Ontario and New Brunswick, are common, and butter, meat, eggs, and vegetables are produced.

Hakodate is an old and important city of the island. It is the chief landing-place for those coming by ship from Honshu. **Otaru** is the chief lumber-exporting centre. **Sapporo** is the administrative and cultural centre of Hokkaido.

Honshu, or Main Island, corresponds in size and importance with Great Britain; Honshu having an estimated population of 52,000,000 with an area of 88,919 square miles, and Great Britain 50,000,000 people with 89,041 square miles. The increasing pressure of population in Great Britain is a well-known problem. There is an even more serious problem facing the Japanese people in Honshu, as may be still further shown by comparing the 11,000,000 acres of arable land in Honshu with the 13,000,000 acres in Great Britain. In the whole of Japan proper (which includes Hokkaido, Honshu, Kyushu, and Shikoku) there is an area of only 141,529 square miles and an estimated population of 83,000,000. These people must all have something to eat, and this must come either from the land, the sea, or by purchase from abroad. The arable land in Japan proper is about 14,900,000 acres, of which 7,674,000 acres are devoted to paddy (rice) fields and 7,226,000 acres is upland, where some rice is grown. Only 15% of the total area of Japan is arable land, the rest consisting of city, town, and the village areas, mountains, lakes, rivers, forest, and waste land. The cultivated part is so valuable that it is cut up into very small holdings. The cultivation of the rice crop requires a great deal of handwork, and very little modern labour-saving machinery can be used in either planting or harvesting. On the uplands where wheat, barley, millet, and vegetables are grown, the individual holdings are so small that the farmer is not warranted in going to the expense of buying machinery. As far as agriculture is concerned there has been less modernization than in the other Japanese industries.

Rice.—The Japanese live mostly on rice and fish. Meat is expensive and very little is eaten. Rice is the staple crop. Every suitable foot of arable lowland and all uplands which can be irrigated are planted in rice. From planting to harvest requires four months, and in the more favoured localities of southern Honshu a second

crop consisting of beans, peas, and vegetables can be grown. The average production of rice in Japan compares favourably with the Canadian wheat crop in quantity. This great amount of rice is not sufficient for home consumption and millions of bushels are imported each year to make up the deficiency. It is impossible to increase the rice-growing areas in Japan, but the population continues to increase, which means an ever-increasing amount of imported rice.



Courtesy Wheeler Newspaper Syndicate

Transporting rice across a flooded paddy field.

Sericulture.—Since the holdings of the agricultural class are so small it has been necessary for the Japanese farmer to engage in other occupations in order to supplement the return from his land. Sericulture, or the rearing of the silkworm and the growing of the mulberry tree, is the most important of these pursuits. This is carried on principally in the upland area of central Honshu, although silk is produced throughout the island. Nowhere in the world does the mulberry tree grow more vigorously than in Japan. The summer monsoon brings the warm rains which make the mulberry trees yield an abundant growth of leaves, at the very time that the young silkworm is feeding voraciously. The cyclonic storms in late August ensure a second crop of leaves. Similar conditions are found in the Yangtze valley of China, the other great silk-producing region in Asia.

The culture of the silkworm is light work suitable for women and children. The leaves are gathered at daybreak and brought to

the worms, which are reared in trays. These must be kept clean so that no disease may spread. When mature, the worms crawl into bundles of straw and weave their cocoons, which must be picked out by hand. In all this process handwork is essential and cheap labour must be available. Silk culture will, therefore, be found in those places where there are dense populations and where labour is cheap. It is also necessary to have labour that is constantly alert, patient, and careful. The farmer's family supplies this care. If it were not for the profit derived from this subsidiary occupation Japanese farmers of middle and lower grade would hardly be able to maintain themselves.

The Japanese are one of the world's greatest exporters of raw silk. During the years 1934-1939 Japan supplied 80% of the silk available to international trade. China, India, and Italy also supply raw silk for the world markets. The United States, the great manufacturer and user of silk, buys 90% of its supply from Japan. The Government of Japan, realizing the importance of the silk trade, established departments to investigate the breeding of better silkworms and methods of combating disease.

Silk has suffered from the competition of rayon, nylon, and other synthetic fibres, and in Japan a steady decline in the production of raw silk occurred after 1934. The disruption of trade during the years of the second World War has also assisted in this decline.

Other forms of agriculture.—Tea has been grown in Japan for many hundreds of years. Owing to the increasing population and the limited amount of agricultural land the tea business is not increasing in either acreage or output. At present about 108,000 acres are devoted to the tea plant, and over a million people secure employment in growing and curing this product. Japanese tea is of high quality, the growers refusing to use machine processes on the ground that it leads to deterioriation in quality and flavour. The hand-cured tea is much more expensive and the large plantations of Ceylon, India, and Java are able to undersell the Japanese product. Forty per cent of the tea grown in Japan comes from the Shizuoka district. The United States takes 80% of the amount available for export. Nearly all the tea produced in Japan is green tea, the Gyoluro variety being the most popular.

Agriculture, as we know it in Canada, is vastly different from agriculture in Japan. In Canada we are concerned with the growing of wheat and other grains, with vegetables and fruits, and with

dairying and stock-raising. It is reasonable to inquire: 'Does Japan produce any of these?'

Grain.—Barley and wheat are grown on upland farms, the barley predominating. The same grains are grown as a second crop after the rice is harvested from the paddy fields. Millet, buckwheat, and maize are also grown and in a similar manner. Very little of the land in Canada can be made to produce a second crop within a period of twelve months. This is due to the high latitude, to the length of our winter season, and the prevalence of spring frosts. In countries such as Egypt, India, China, and Japan, the lower latitude and the use of irrigation make it possible to grow two and sometimes three crops in a year. In all these countries the population is very dense. We, in Canada, often wonder how so many people can make a living by tilling an acre or two of soil. The ability to grow more than one crop each year partly explains this situation. The peoples of these countries live on much less food than we eat and certainly have very little variety in their diet.

Vegetables.—Where grain can be grown as a crop following rice it will be easy to grow vegetables. We find that the Japanese live mainly on a rice-vegetable diet. Soya beans, red beans, peas, sweet potatoes, and our well-known white potato are grown in large quantities. Other minor crops are the radish, taro root, onion, cabbage, turnip, burdock, and carrot.

Stock-raising has not prospered in Japan, because of religious reasons, the climatic condition, and the absence of good pastures and grass. The wild bamboo grass native to Japan does not provide good forage and it is a difficult matter to eradicate it and seed the land to European varieties of grasses or clovers.

Hokkaido is becoming the chief cattle-raising district owing to the cool climate and better pastures.

The average Japanese eats but 3 lbs. of meat per year. When this is compared with the meat consumption of the Australians, or with 80 lbs. *per capita* in the United States, the contrast is remarkable.

The milkman going his rounds is not a common sight in Japan. Milk soon sours in a hot climate, and refrigeration is expensive. Millions of Japanese hardly know the taste of fresh milk. Condensed milk is used by some of the people in the large cities and Japan imports over $2,000,000 worth of this product. Butter, which is used by everyone in Canada, is even rarer than milk in

Japan, and the Japanese boy, who reads about the Canadian boy eating his slice of bread and butter, must have a hard time in trying to translate this into terms of a bowl of rice and a piece of fish.

Fruit.—The Japanese people delight in colour. The European visitor is constantly made aware of the varied colour-schemes used in the dress of the people, in their homes, and in the wonderful variety of flowers and plants, arranged with so much care and artistry. Japan is well known as 'The Land of the Rising Sun'. It is also dear to the hearts of the people as 'Cherry Blossom Land'. The mild climate and well-distributed rainfall account, to a large extent, for the ease with which flowering shrubs and trees can be grown.

Many delicious fruits thrive well. The more important ones are plums, peaches, pears, persimmons, apples, grapes, and oranges. In central Honshu apricots, almonds, and walnuts are produced on the higher lands sloping up to the Mountains. The Japanese cherry trees are chiefly prized for their flowers. Foreign cherries are grown in northern Honshu. The small Japanese orange is exported each winter to the western seaboard of America and is found in the toe of many a Christmas stocking throughout western Canada.

Fishing.—Owing to the large and constant demand for fish, this industry has always been extensive in Japan. Along the 13,000 miles of sea-coast a very great amount of fish is caught. They are of many varieties. In the north, the Japanese catch salmon, cod, crabs, whales, and herring. The latter provide the largest tonnage. South of Hokkaido, bonito, mackerel, tunny, yellow-tail, and sardines are caught in large numbers. These varieties remind one of the California fisheries.

With a home market where the majority of the people eat no meat, the fishermen have no difficulty in selling their catch. Because of easy access to inland towns, cities, and agricultural districts, no one place stands out as an important landing-place. There is no Prince Rupert, or Lunenburg, or Grimsby in Japan, but there are thousands of small fishing villages scattered around the coast.

Canned crabs, canned salmon, dried cuttlefish, and whale-oil are exported. Pearl fisheries are important in the warm waters around the southern islands. Cultured pearls are also produced in oyster beds.

Mining.—Japan is poor in mineral resources and it is only in the production of copper ore that she has enough to supply her own requirements. Copper is widely distributed. Mines are being worked in northern Kyushu, central Shikoru, and southern, central, and northern Honshu. About 150,000,000 lbs. are produced annually.

Coal is the most valuable of Japan's minerals. The principal collieries are located in Kyushu, Honshu, and Hokkaido. Japan is almost self-supporting in regard to coal, a fact that is tremendously important in these days of factories and machine production of goods. Chinese coal is imported to a limited extent, and this has caused the closing down of the poorer Japanese mines. Nagasaki, on the south coast of Kyushu, is near an important coal-field. On the north-west of this island the large Wakamatsu steel-works are located near another coal-field.

Iron.—Of all the minerals Japan feels the greatest shortage in iron ore. Native iron ores produce only a fraction of the amount required. The remainder is imported as ore, scrap-iron, or manufactured material from China and the United States.



Courtesy Wheeler Newspaper Syndicate

JAPANESE SALT PRODUCTION.

Salt impregnated earth gets doused with more salt water from the sea. The salt is forced into bamboo pipes which carry it to a processing plant.

The Japanese islands are crossed by volcanic ranges and have some rich sulphur deposits. Only high-grade deposits containing not less than 40% sulphur are worked. The chief centres of sulphur mining are in northern Honshu and eastern Hokkaido.

Oil-wells have been opened along the north-west coast of Honshu. These supply a small part of the country's total requirements. The balance is imported from the United States of America and the United States of Indonesia.

The Fukuoka district of Kyushu supplies zinc ores. Some gold and silver are found in conjunction with the copper and lead-zinc ores, as in Canada.

Manufacturing.—Before the second World War the Japanese were the industrial leaders of Asia. This had been accomplished since the first three treaty ports were opened to foreigners in 1858. Within the next ten years the Japanese became eager to learn from the European. Colleges and universities were opened, foreign science teachers were employed, and Japanese students were sent abroad to learn from Europeans and Americans alike. So well did they learn and so quickly was this change made, that by 1908 Japanese shipping lines had gained control of a large share of the carrying trade between Japan and India. Japanese ships built in Japan carried a large part of all Pacific-borne freight. In addition, Japan built a strong navy and stood next to Great Britain and the United States as the third great naval power in the world. Railways and telegraph lines were constructed until the main islands of the Japanese group had over 12,000 miles of railway lines. All the equipment for the railways was made by Japanese steelworks and machine shops. Japan boasted of shipping in excess of 5,000,000 tons and had shipyards located at Kobe, Osaka, Tokyo, Yokohama, and Nagasaki.

Cotton.—The spinning of cotton threads is a major industry. In recent years export of cotton yarns and fabrics has amounted to 30% of the total value of Japan's export trade. This development is the more remarkable in view of the fact that Japan depends upon a foreign supply for the raw material and for some of the machinery. Cheap female labour and nearness to China, one of the world's great markets for cotton yarns, have been a help in the growth of the Japanese cotton-spinning industry. The raw cotton is imported from the United States, China, and India.

It is interesting to note that the Japanese cotton manufacturers also established factories in Shanghai, Tsingtau, Hankow, Woosung, and Manchukuo.

The spinning of silk is a secondary enterprise of the cotton mills. Hemp is manufactured by a number of mills and these now supply the home market to the exclusion of foreign importations. Silk-cotton goods are manufactured on a large scale. The Japanese mills now practically supply their home market for woollens.

Porcelain and pottery works give employment to many people and for some years before the second World War, Japanese porcelain and pottery wares were well known in Canadian and United States homes.

The supplying of sugar for 83,000,000 people is a great business in itself and the Japanese have a sweet tooth. 876,000 tons of refined sugar are required each year to meet the home demand. Very little sugar-cane is grown in Japan.

Japan produces her own dye materials for her large textile trade. The toy industry is on a large scale. Certain centres specialize in certain articles. Tokyo produces mainly toys made of celluloid, tin, and rubber; Osaka is noted for its cloth toys and paper novelties; Kyoto for its exquisite porcelain, toys and earthenware. In the manufacture of dolls Kyoto leads Tokyo and Osaka. Straw and chip, and hemp braids, are manufactured in Okayama. Osaka is noted for its manufacture of pearl or shell buttons.

GREAT CITIES OF JAPAN

Because of the fear of air raids, the Japanese government during World War II distributed the concentrated urban population over a wider area. Whether population distribution in post-war years will follow the same pattern as previously, remains to be seen. A good example of the shifting of population during war years is shown by the shrinking of Tokyo's population by nearly four millions.

Many of the factories in industrial centres that were destroyed by bombing during the war have not been re-established in the same location.

The following descriptions of great cities of Japan is based on information which was true before the second World War.

Tokyo is the capital of Japan and enjoys a commanding position at the head of Tokyo Bay, about midway along the Pacific coast of Honshu. The plain which extends in a wide arc around the bay is one of the most densely populated areas in all Japan. The city was devastated by an earthquake and fire in 1923, but the work of reconstruction was begun at once and in 1930 the great

task was virtually complete. A new Tokyo has risen from the ashes of the quake, a city of modern streets, of fire-proof bridges over the river (the Sumida) which winds its way across the plain. Fine buildings are seen on the main thoroughfares, and numerous parks invite the visitor to rest and enjoy their delights. A modern water supply and sewage system make Tokyo one of the healthiest of Asiatic cities. Tokyo is not only the seat of the Government, the political centre of Japanese life, and a university centre of note, but it is a manufacturing centre as well.



Courtesy Triangle Photo Service

An old Japanese woman intently studies this Yokohama street merchant's display of shiny tea kettles. Note the face mask to guard against colds.

Yokohama is the principal seaport of Japan. It is situated nineteen miles from Tokyo, just inside the entrance to Tokyo Bay. Electric trains running every eight minutes connect the two cities. Yokohama was opened to foreign trade as the result of a treaty negotiated by Commodore Perry, whose small squadron first anchored near the entrance of the bay. At that time Yokohama was a fishing village of possibly a hundred dwellings. Today its wharves berth the largest ships which ply on the Pacific and its warehouses handle goods from all over the world. Yokohama is the chief centre of the silk trade.

Osaka, sometimes called the Manchester of Japan, is the chief commercial centre of the empire. Cotton mills, steel-works, and factories of every description make it the wealthiest city in Japan. A wide plain surrounds Osaka Bay, and a few miles distant the harbour of Kobe gives access to the Inland Sea. Coal is brought in from the northern end of Kyushu, raw cotton and ore are unloaded at the docks, and the factories of Osaka manufacture raw materials into finished products of trade.

Kobe, the Liverpool of Japan, is the chief cotton port of the country. It is said that all the wares of the Orient can be purchased in the shops of Kobe.

Kyoto is the one large city on the Japan Sea coast of Honshu. For a thousand years and more, until 1868, Kyoto was the capital of Japan. The city is rich in historic association leading back into the ancient life of the empire. It is still the centre of the fine-art industries of Japan, and excels in hand-made products such as lacquer work, silk embroidery, and brocades; cloisonné, damascene, satsuma and other porcelains, bronzes, fans, dolls, and bamboo ware.

Nagoya is situated at the head of a large bay between Osaka and Tokyo. It is the centre of the pottery and porcelain industries. Electrical energy from the Japanese Alps is a main factor in the growth of the city.

Kyushu and Shikoku are the two moderate-sized islands which together form a protecting screen for the famous Inland Sea. Kyushu is about the size of Vancouver Island and Shikoku may be compared with Wales in area. From the standpoint of population, however, startling differences are found. Kyushu has 8,500,000 and Shikoku 3,173,000 people. Since these islands are mountainous and have small areas suitable for agriculture the pressure of population is as severe as it is in Honshu.

The chief industry of Kyushu is coal-mining. Nagasaki is the largest city and owes its importance to the export of coal and to shipbuilding.

Formosa

Formosa lies between 21° and 25° N. latitude. It is a volcanic out-thrust, and forms a southern link in the chain of islands which borders the Asiatic coast from Kamchatka to Hong Kong. A high mountain range extends along the eastern side with peaks rising to

14,500 feet in height. The western part has plains sloping gently to the sea.

The Japanese secured Formosa from China in 1895 and at once began a thorough cleaning up of the fierce hill tribes whose raids made life on the plains one long tale of head-hunting and murder. By 1926 the tribes had turned in their arms, and crimes of violence had decreased from 761 in 1912 to 2 in 1925. The way in which the Japanese set Formosa in order shows, in an outstanding manner, the organizing ability of this island race.

After the second World War, Formosa was returned to China. A railway line now extends from Keelung in the north through the plain to Takao in the south. **Taihoku** is the capital. Elementary and high schools have been established.

Formosa is the home of the camphor tree. The camphor is distilled from the wood of the tree and is used in making celluloid.

Oolong or green tea is a product of Formosa. It has a distinctive flavour and is highly esteemed by tea-drinkers. The Americans take about half of the oolong tea exported from the island. English tea merchants also import oolong for blending with black tea from India. The tea is grown on hill-sides which rise up from the plain. It seems possible to expand the industry to many times its present value.

The major industry of Formosa today is the growing of sugarcane, which is exported to Japan. The total production amounts to about 800,000 tons. Rice is grown on the lowlands of the plain and two crops a year are secured. Sweet potatoes are a staple foodstuff of the natives and are grown all the year round. Ramie, jute, indigo, and peanuts are also produced.

Korea

Korea (formerly known as Chosen) is a mountainous peninsula lying between the Yellow Sea and the Sea of Japan. The territory was annexed by Japan in 1910. Nine years later, by an Imperial Rescript, Korea became an integral part of the Japanese Empire. The independence of Korea was established in 1948, when it was proclaimed a republic.

Northern Korea is rich in timber. In the south, the mountains extend along the eastern coast, which is steep and rugged. The slope to the west is more gentle, and here we find quiet streams and fertile agricultural lands. On this western slope is the bulk of the population. The climate of the peninsula is tempered by the surrounding seas and is much milder in winter than that of cor-

responding latitudes on the mainland. The summers are not so hot and the winters are not so cold as in Peiping. The rain comes mostly in summer and is heaviest on the east coast.

During recent years schools have been established and at present over 20% of the native Korean inhabitants can read and write. The number is increasing each year. Ancestor worship, as in China, is deeply rooted and the progress of civilization is slow. The Korean is not ambitious and lacks the fire and energy of the Japanese. He works well under efficient direction.

Rice is the staple product of Korea, one-third of the arable land being used in its production. Rice is exported to Japan to the value of $50,000,000 annually. The Koreans have gone in for silk culture and export cocoons and raw silk to Japan. Soya beans rank next in value and are proving to be a good money crop. Barley, wheat, maize, and tobacco are also raised. Cotton is grown on the upland fields.

Cotton, cotton yarns, and sheetings are imported from Japan and constitute the most valuable item of the import list. Cattle reared on the pasture lands of northern Korea are noted for their size and strength. Every farmer there keeps a head or two. The export of meat is to Japan. The 9,000 miles of coastline offer excellent grounds for fishermen. Cod, pollock, and herring are caught, and the Korean peasant eats his daily bowl of fish and rice as does his cousin in Japan.

Mining is growing in importance. Iron, gold, coal, and copper are the chief minerals taken from the mountains.

The main railway line runs from Fusan to Antung, 590 miles, where it connects with the Antung-Mukden line of the South Manchuria Railway.

Seoul is the capital and largest city. Chemulpo is its seaport, but Fusan is the principal import-export and manufacturing centre at the south-eastern tip of the Korean peninsula. It has direct steamer connections with Japan proper.

Korea is rapidly approaching the condition where the land will not support a larger population. With a highly industrialized Japan only a few miles away, the outlook for manufacturing in the peninsula is not very bright. In addition, the devastation caused by the Korean War, which began in 1950, will set back the development of the country for many years.

EXERCISES

1. Japan has been called the Great Britain of the Pacific. What support can you find for this statement?

2. The population of Honshu, or Main Island, is now at the saturation point, yet the population continues to increase. Japan is importing food for her people. What possible solutions are there to this problem?

3. What natural conditions have influenced the growth of sericulture in Japan? Why is this industry centred in regions of dense population and cheap labour?

4. What are the principal products of Formosa, and to which countries are they exported?

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SOUTH-EAST ASIA

Indo-China, The Federation of Malaya, Singapore, British North Borneo, Brunei, Sarawak, The United States of Indonesia, Philippine Islands

Indo-China

Indo-China, as the name suggests, lies between China and India. It includes the kingdom of Thailand, (formerly known as Siam) and the colonies and protectorates of French Indo-China. The mountainous interior is practically unexplored, but in it two important rivers, the Mekong and the Menam, have their source. In their lower courses these rivers occupy broad, alluvial valleys, and it is in these valleys that most of the people are found.

The climate of Indo-China resembles that of India. Both are monsoon lands with summer rains which are very heavy near the coast. The north-east winter monsoon brings rain to the eastern section and to the isthmus of Kra, but elsewhere it creates a drought. The temperature in the plains is everywhere uniformly high. The mountainous interior is cooler and drier because of the altitude and the distance from the sea.

The people are Buddhists in religion. They appear to have come from China hundreds of years ago and to have conquered the land from the Malays, whose language they adopted. Unlike the Chinese, the people of Indo-China have readily adopted many western European ideas. Siam has a university at Bangkok where medicine, engineering, political science and literature are taught. Trade, and many of the industries, however, are in Chinese hands and there is a large Chinese population in the cities.

Thailand consists of the basin of the Menam, the upper basin of the Mekong, and a long section of the Malay peninsula. The Menam is an important highway of commerce, and the broad plain through which it flows is well developed. Rice is the chief product, the chief food of the people, and the chief export. The

northern forests contain splendid teak wood, which, when dry, is hauled by elephants to the river and floated down to Bangkok. Tin is also produced: Puket Island on the west coast is practically one vast tin mine. Cotton, sugar, millet, and paper are grown for local use. Elephants and buffaloes are used as draught animals and beasts of burden.

Bangkok is the capital and leading city of Thailand. It is situated at the mouth of the Menam, but trade is hampered by sand bars. These prevent ocean shipping from reaching its wharves, and as a result much of the Siam trade goes by rail to Singapore.

'Siam' is a foreign name. The people call their land 'Muang-Thai', or 'Kingdom of the Free' and are proud of the fact that over 80% of the inhabitants are *thai*.

The Indo-Chinese Federation (French Indo-China) consists of the states of Viêt-Nam, Laos and Cambodia. Until the beginning of the second World War, French Indo-China was made up of the colony of Cochin-China, and the four protectorates, Annam, Tongking, Cambodia and Laos. A strong nationalistic movement



Courtesy United Kingdom Information Office

A Street in Saigon.

Saigon, the capital of Viet Nam, is sometimes called 'the little Paris of the East'.

began during the war and the Republic of Viêt-Nam was formally recognized as a free state. In 1948, a new government was set up uniting the pro-Fench groups in Annam, Tongking, and Cochin-China. The Union is represented in Indo-China by a High Commissioner.

Saigon, with a population of approximately 256,000, is the capital of Viêt-Nam.

Mining is most developed in the Tongking district which occupies the delta of the Red (Songka) River. Coal, iron ore, tin, zinc, tungsten, and gold are some of the minerals mined.

Cambodia and Cochin-China occupy the lowlands of the Mekong; Annam is the narrow costal plain bordering the South China Sea; Laos includes the upper reaches of the Mekong and has valuable teak forests.

Rice is the great crop on the lower flood plains of the Red and the Mekong Rivers. About 1,250,000 tons are produced annually Cotton and sugar are exported to Japan. Cambodia is famous for its pepper groves. Tea, maize, and tobacco are also grown, and rubber and coco-nut plantations have been established by the French. One native industry of western Cambodia is most unusual. The Mekong River has a large reservoir, Tonle Sap or Great Lake, where the overflow waters from the summer floods are stored. During the low-water season the lake is slowly drained, leaving hundreds of ponds which are literally alive with fish. The natives flip the fish out on the bank and either smoke them or salt them for trade down river.

The Federation of Malaya

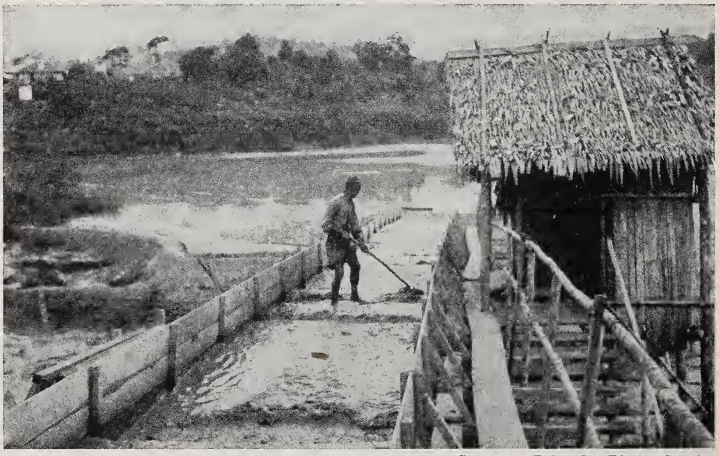
The Federation of Malaya is a group of territories situated in the southern section of the Kra Peninsula and bounded on the north by Thailand. The Federation consists of the nine Malay States of Johore, Pahang, Negri Sembilan, Selangor, Perak, Kedah, Perlis, Kelantan, Trengganu, and the two British settlements of Penang and Malacca. The Central Government consists of a High Commissioner, appointed by Great Britain, and a Federal Executive Council and Legislative Council.

The Federation covers an area of approximately 50,850 square miles with a population of a little over 50,000,000. The population is about one-half Malay, the rest being largely Chinese, Arab, Indian, and Eurasian. Indians and Arabians were the greatest influence on the Peninsula before the advent of the Europeans.

The Malay Peninsula is divided into two unequal parts by a range of mountains lying north and south. It is in the path of both

the north-east and south-west monsoons and the principal features of the climate are heavy rainfall, high humidity and uniform temperature. About 80% of the whole area consists of primeval jungle, mountains, and swamps. The two principal rivers of the Peninsula are the Perak and the Pahang.

Tin.—The deposits of alluvial tin in the Malay States are the most important source of tin in existence. The greater part of it is secured by placer-mining, but dredging, hydraulicking, and lode-mining are also employed.



Courtesy Triangle Photo Service

TIN MINING, MALAYA.

Earth containing tin ore is placed in a chute and water is run over. The heavy tin ore settles at the bottom while gravel and other waste is washed away.

Rubber is Malaya's most important vegetable product, and from this area is secured nearly half of the world's output. Part of it is 'wild' rubber gathered by the natives, sun-dried and marketed in the form of 'blankets' or smooth-rolled sheets; by far the greater part is scientifically produced on plantations owned by British companies.

On the plantations the rubber trees are set out about twelve feet apart with a distance of twenty-four feet between the rows. Sometimes, during the early years of the trees' life, crops of coffee or pineapples are grown between them, but clean cultivation is a more common practice. Tapping begins as soon as the trees reach six inches in diameter, measured at three feet from the ground. This is generally during the sixth year. The tree is tapped by

making a clean, slanting cut through the bark with a shark knife. This starts the flow of the creamy-coloured latex, which drips into small cups fastened to the tree. Later in the morning it is carried to 'factories' on the plantation where it is thickened and pressed into sheets for export. The annual production from one tree ranges from three to six pounds.

Other products.—Malaya is largely self-supporting in foodstuffs, though small imports, such as rice, are necessary. Coco-nuts are grown in abundance and considerable quantities of rice, sugar, tapioca, pepper, gambier, nipah, and palm-oil are produced.

Coal and gold are mined, and the vast forests have plentiful supplies of timber, canes, oils, and resins.

The Former Straits Settlements

The former Straits Settlements comprised the settlement of Singapore, the Cocos-Keeling Islands, Labuan Island and Christmas Island, Penang, and Malacca. Christmas Island and the Cocos-Keeling Islands are now governed as Dependencies of Singapore and Labuan Island is under the jurisdiction of the Government of North Borneo. Penang and Malacca form part of the Federation of Malaya.



Courtesy United Kingdom Information Office

A Chinese woman does her shopping at a street vendor's stall in Singapore.

Singapore

Singapore, a British Crown colony, is an island twenty-seven miles long and fourteen miles wide, separated from the southern tip of the Malay Peninsula by a narrow strait over which a causeway has been built to carry a road and a railway to Johore.

The capital is the city of the same name and before the second World War, the harbour, in point of trade, was one of the greatest in the world. All shipping from Europe to far eastern ports must call at Singapore as it lies directly on the main trade route. A very large part of the trade of the East Indies reaches the world's markets through Singapore, and, to a lesser extent, Penang, because the British merchants of these ports have been so successful in guiding the development of Chinese business organization. The fact that Singapore is a free port is partially responsible for the remarkable trade that passes through it. The main exports are tin, rubber, spices, gambier, gums, tapioca, sago, copra, preserved fruits, and hides.

British North Borneo

British North Borneo occupies the northern part of Borneo, the third largest island in the world. It is bordered on the south-west by Sarawak and on the south-east by the new Indonesian state of East Borneo. North Borneo has an area of 29,387 square miles and an estimated population of 345,000, which consists mainly of Mohammedan settlers on the coast and aboriginal tribes inland.

The chief industry is rubber cultivation and rubber forms one of the main exports. Other exports include tobacco, coal, copra, camphor, and timber.

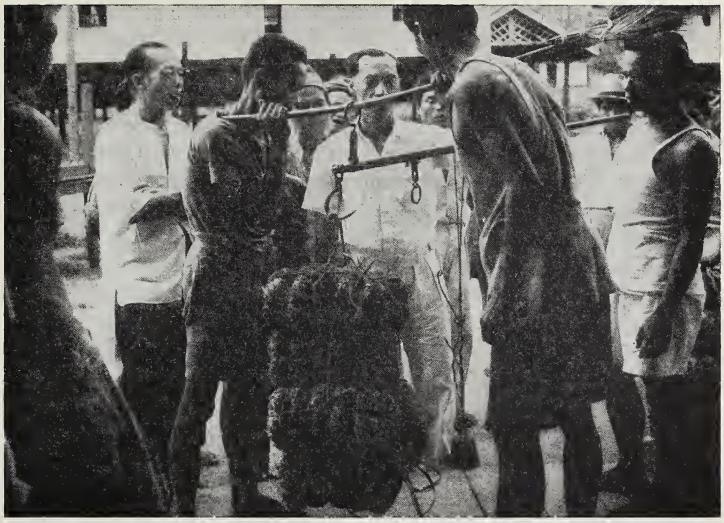
The main towns are situated on the coast and all have good harbours. Amongst these are Jesselton, the capital, and Sandaken, the former capital.

Brunei and Sarawak

Brunei and Sarawak are states adjoining British North Borneo on the island of Borneo.

Brunei has an area of some 2,226 square miles and a population of 40,657. The majority of the population is Muslim. The capital city of the same name is situated on the Brunei River and a great part of it consists of houses built on piles on mud flats in the river, many being connected by bridges.

The only other town of any size is Kuala Belait, a modern town situated in the centre of a rapidly expanding oil producing district.



Courtesy United Kingdom Information Office

SARAWAK.

The product, birds' nests, here being weighed, forms the base of a world-famous delicacy—birds' nest soup.

Sarawak, with an area of about 50,000 square miles, consists of a narrow coastal strip adjoining Brunei. The capital is Kuching on the Sarawak River. Agriculture is the main industry and rice is cultivated extensively. Exports include rubber, which represents approximately 60% of the total value of exports, and sago flour, and pepper.

The Sarawak oil-field was severely damaged during the second World War but reconstruction work was commenced immediately after and oil is again being produced. Another valuable mineral mined in Sarawak is gold.

THE UNITED STATES OF INDONESIA

The United States of Indonesia comprise the former Dutch colonies of the East Indies. These include Java, Sumatra, Celébes, about two-thirds of Borneo, and about two-thirds of New Guinea, together with a large number of smaller islands. The total area is about 735,000 square miles (sixty times that of Holland) and the population 60,700,000 (seven times that of Holland). The whole settlement extends about 3,100 miles from west to east and 1,200 miles from north to south, and lies on both sides of the equator.

This new republic is the result of a strong nationalistic move-

ment among the Indonesians which brought about armed conflict between Dutch and native forces. In 1948 an agreement was reached whereby the independence of these people was recognized by the Dutch.

Sumatra, Java, some of the smaller islands, and New Guinea, form an arc of a great circle, which in reality is a rampart of volcanoes, forming the other boundary of the group. Borneo and Celébes are separated from the southern islands by the shallow Flores and Java seas. All have an extensive mountain region, a coastal plain, and, between these, a comparatively narrow hill-land. Sumatra's mountain range drops abruptly to the Indian Ocean, but, on the east, slopes gradually to a broad alluvial plain, stretching towards the Strait of Malacca and the China Sea. The western part of Java is mountainous, with many active volcanoes. In the centre and east single volcanoes rise from a rich alluvial plain. Northern Borneo is occupied by a mountain range in which four river systems of considerable size have their source. These rivers, all navigable for some distance from their outlets, flow through alluvial plains which widen out into vast swamps in their lower reaches. These swamp-lands are characteristic of the coastline.

Ranges of volcanic mountains cross Celébes from north to south. The coastal region consists of low hills or narrow plains except in the western part where there are large swamp areas.

Climate.—With a latitude ranging from 6° N. to 11° S., the difference between the shortest and the longest day in the year is only forty-eight minutes so the temperature is very even, averaging 80° F. at the coast. The rainfall is usually heavy from November to January and light between May and August, but there is a definite dry season only in the south-eastern part of the archipelago. The annual amount of rain varies greatly. It is brought chiefly by the monsoon winds, which are very irregular in this section.

People.—The population of the United States of Indonesia is divided into three groups: native, foreign Asiatic, and European. The natives, who are of many tribes and many languages, represent about 98% of the total; there are about 200,000 Europeans, chiefly Dutch. The Asiatic foreigners, numbering over 1,000,000, include Chinese, Malayas, and Arabs. The Arabs were well established in the Indies long before Magellan discovered the 'Spice Islands'. Through their influence Mohammedanism has become firmly rooted and is the religion of the majority of the natives who have come in contact with civilization. Java, with

Madoera, has a population of about 47,456,000 in an area of 50,745 square miles, making it one of the most densely populated regions of the world.

In the more remote regions, the natives have received little or no influence from the more recent settlers in their country and still live in the style to which they were accustomed before the advance of world trade to this area.

Production.—The rich volcanic soil of Java, a docile people, and Dutch thrift and energy have made Java one of the world's greatest producing areas. Scattered over the island are agricultural estates owned by Chinese or European companies, yet the greater part of Javanese soil belongs to and is cultivated by the natives. Rice, maize, and other food products are grown for local consumption, while sugar, rubber, coco-nuts, coffee, tobacco, and cinchona bark (for quinine) are produced for export.

Little effort had been made by the Dutch to develop agricultural areas, apart from Java, except on the east coast of Sumatra, where there are extensive tobacco, rubber, and tea plantations, and in Celébes, the 'Spice Islands' of romance, where the finest type of nutmegs and mace are grown.

Extensive fisheries in the waters around the islands supply the requirements of the population, while a large amount of sea salt is produced under government control on the island of Madoera. Agar-agar is used locally and exported; tortoise and sea shells are obtained in important quanties.

The United States of Indonesia are second only to Malaya in the production of rubber and tin; Java stands next to Cuba in producing cane-sugar, and it exports more coffee than any other part of the old world.

Batavia, in Java, is the largest city and chief seaport. It is also the capital and has been renamed Jogja Karta.

Philippine Islands

In 1946 the United States formally recognized the Republic of the Philippines as a free and independent nation, though the United States still retains military and naval bases on the islands.

Discovered by the Spaniards and named after Philip II, these islands belonged to the United States after the Spanish-American War in 1898. Altogether there are over seven thousand islands, eleven being of considerable size. Luzon and Mindanao are of chief importance.

The islands are mountainous, but fairly large areas of coastal

and river plain are found. Many islands are volcanic and destructive earthquakes are frequent. Terrific storms called *typhoons* blow from the China Sea and do great damage. They are accompanied by heavy rain and by winds so strong that trees are uprooted and towns and villages destroyed. The climate is generally very hot with abundant rainfall.

The population numbers over 19,000,000. Several thousand Chinese and a handful of Americans and Europeans are resident for business or official reasons. During the Spanish rule the natives became a civilized people, speaking Spanish and adopting Christianity. The United States has aided them by establishing public schools, by building roads and railways, and by instructing them in agriculture. As a result the prosperity of the people has been greatly increased. Ninety per cent are Christians, chiefly Roman Catholics, and it is said that more natives can read and write than in all other East Indian islands combined.

Agriculture is the basic industry. Almost every Filipino is a small farmer. He grows rice, bananas, sweet potatoes, and vegetables to supply his family; and coco-nuts, sugar-cane, tobacco, and abaca plants for sale. The Philippines lead the world in their export of copra and coco-nut oil; tobacco is made into cigars in local factories; the abaca plant, a cousin of the banana, furnishes strong fibres called manila hemp, and is used for rope and binder twine.

The livestock industry is increasing rapidly. There are many cattle, sheep, hogs, and horses. As a beast of burden the carabao, or water-buffalo, is in common use.

Exports are manilla hemp, coco-nut products, sugar, tobacco, and hats. Cotton cloth is the chief import, followed by machinery and illuminating oil.

The capital and chief city is Manila, on Luzon Isalnd. Cebu and Iloilo are also important.

Guam, a small island, 1,400 miles east of the Philippines, was ceded by Spain to the United States in 1898. It is now an American naval station.

Samoa is a group of islands in the western Pacific, about 450 miles north-east of Fiji. There are eleven islands in all, four being under British control and the rest under American. The natives are pure Polynesians.

American Samoa has a United States naval station and a high-powered United States naval radio station. Copra is the only export.

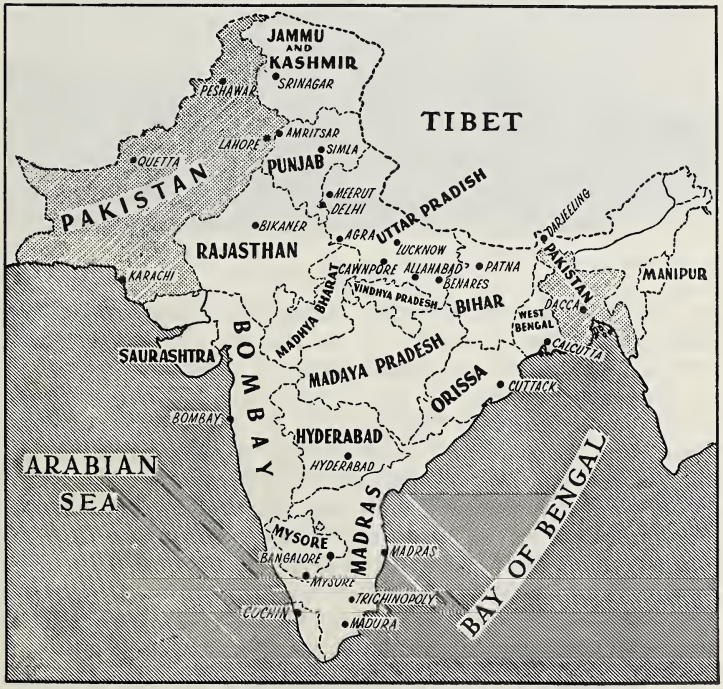
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SOUTH ASIA

India, Pakistan, Burma, Ceylon, Maldive Islands

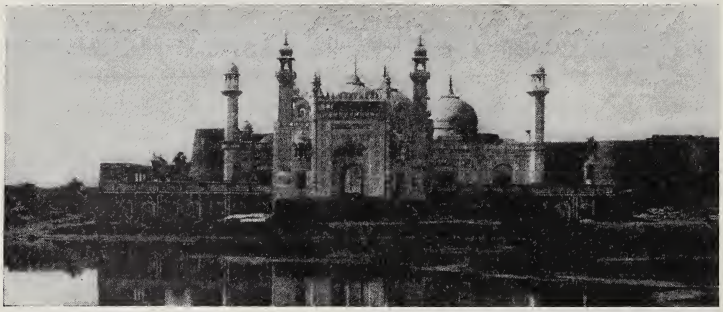
India and Pakistan

One of the great political developments of recent years has been the partition of India into the Republic of India, the Dominion of Pakistan and Burma. In 1937, Burma was made a self-governing unit of the British Commonwealth, but became an independent



The Indian Sub-continent

nation in 1947. Also in the same year, on August 15th, 'Indian Independence Day' saw the end of British constitutional rule. The Dominions of India and Pakistan were organized with full dominion status, and with the right to remain within, or to withdraw from the British Commonwealth of Nations. India chose to become a republic within the Commonwealth, and on January 26th, 1950, the Republic of India was proclaimed. The 563 princely states, which formerly enjoyed a large measure of local autonomy under British rule have been reduced by consolidation and merger with India to about 20. Hyderabad, ruled by a Moslem prince and surrounded by a Hindu India, is still completely independent. Though this political arrangement at the time seemed a solution to India's problems, there are still so many misunderstandings among Moslems, Hindus, Sikhs, and other religious groups, it may not be



Courtesy Government of India

JUMA MOSQUE AT DIRAWAR FORT.

the end of violent political strife. Unless otherwise stated the term India used in the remainder of this chapter will refer to India, Pakistan, and the former princely states of India.

The people of India were the first of the great Asiatic peoples to come into contact with Europeans on a large commercial basis. India is on the main trade route through the Mediterranean Sea, the Red Sea, and the Indian Ocean to the Pacific.

For years millions of Hindus were opposed to the spread of European customs and ideals, but Indian leaders today see much that is good in our Western civilization. On the other hand there is much in our civilization of which they disapprove. They do not wish to be a copy of Britain or of the United States. They want to work out a pattern of life for India, which will best suit their own needs. That we of the West may understand their aims there are various facts which we must consider.

India possesses one of the oldest civilizations in the world. The plain of the Ganges has been occupied for thousands of years, and as much as three thousand years ago a cultured race lived in that fertile plain at the base of the Himalayas. The Indian social traditions, their literature, and their caste system go back to a time much earlier than the invasion of Britain by Caesar. There is no finer architecture than that found in the Taj Mahal, the finest shawls come from Kashmir, and the people have many beautiful examples of inlay work in gold and silver.

The present governments of India and Pakistan are faced with a multitude of difficulties. They must educate their people, care for the sick and undernourished, teach sanitation, develop hydro-electric power, build roads and improve transportation, teach their people new skills and build factories and workshops. Everywhere changes are being made, but years will be needed before the riches of India are fully developed to supply the needs of its people.

The very antiquity of the Indian traditions may make it difficult for them to adopt new methods. India has an area half the size of Europe but a population of 420,000,000. Is it that the population is so dense that new ideas penetrate slowly? Or is it because only 12 per cent of the people are able to read and write? There are thirty languages spoken in India. Would this alone prevent the spread of western ideas? About ten per cent of the Indian people live in cities and towns, the rest of the people live in country districts. Would these people resist change more than those who live in cities?

These are some of the problems which the governments of India and Pakistan must consider. Keep these questions in mind as you read the descriptions which follow.

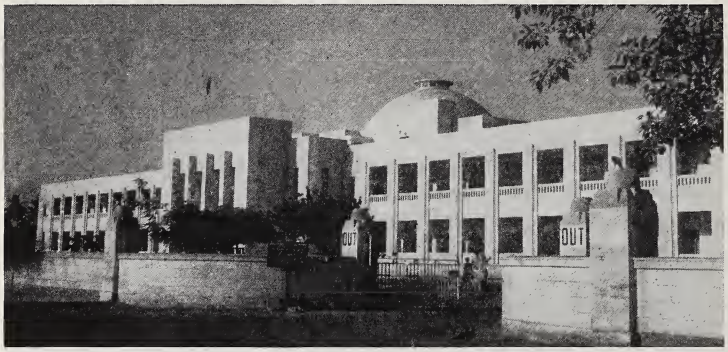
PHYSICAL FEATURES

The sub-continent of India consists of the low plains of the Indus and Ganges river basins and the plateau of the Deccan, the great Asiatic triangle which lies south of the Himalaya Range.

These mountains contain the highest peaks in the world and form a curving barrier between the people who live on the peninsula and those who live in the plateau areas of Tibet and Turkestan. The Himalayas are 180 miles in width and may be traced for a distance of 1,500 miles. The average height is over 18,000 feet, many peaks exceed 24,000 feet, while Mount Everest rises to 29,000 feet above sea-level. The Himalayas are well named 'The Abode of Snow'. The Hindu Kush Range, west of the jumbled

mass of the Pamirs, forms a barrier similar to that of the Himalaya Range, although it is not quite so high. An offshoot of the Hindu Kush, the Sulaiman Range, runs southward to the sea, completing the mountain rim of the peninsula.

High as these mountain barriers are, men have found gateways through them. The Bolan Pass through the Sulaiman Range and the Khyber Pass around the Hindu Kush are the best known of these routes. The Himalayas present a much more formidable front to trade. Difficult routes lead across the mountains to Kashmir and Tibet, but all are over 17,000 feet in height, and none compare with either the Khyber or Bolan routes.



Courtesy Government of Pakistan

The Constituent Assembly building in Karachi, the capital of Pakistan.

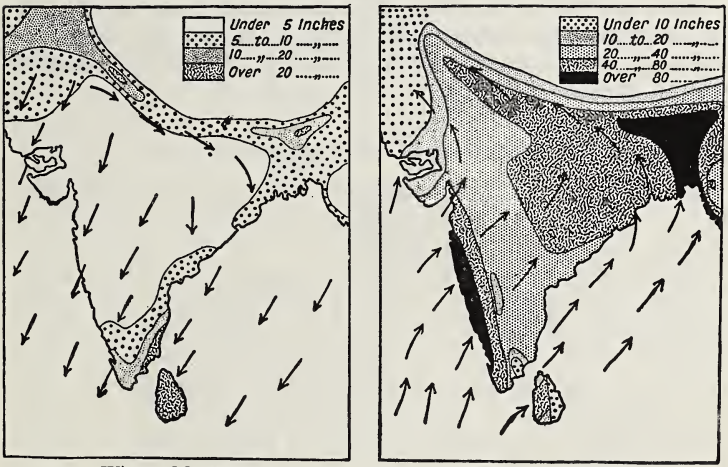
CLIMATE

To understand India we must first get a clear idea of the isotherms and the distribution of rainfall. When the sun's rays are vertical over the Tropic of Capricorn it is the cool season throughout India. During this time the land mass of Asia becomes cold and the winds blow outward, from the land to the sea. To be more exact, the winter winds of India blow from the north-east. In January, central India and the Punjab are cold. This is also the dry season in India. From February to June the cold gives way to heat, which increases until the Punjab becomes the hottest part, with an average temperature of over 90°. The north-east winds have died away and the people experience a period of calm with a few variable breezes. February to June is a hot, dry season.

In June the monsoon begins to blow. The land has become like a furnace, and the air lying over it is heated. It expands and we have an area of low pressure. Moisture-laden winds from the sea

gather strength and flow in from the south-west. The monsoon 'breaks' at different times during June in widely separated places, but the middle of June may be taken as the average time for the beginning of the rains which last from June to October—the hot, wet season.

As the diagram shows, the moisture-laden winds are forced to ascend the Western Ghats and these are deluged with rain. In the lee of the Ghats there is a comparatively dry area, a rain-shadow belt, where storage reservoirs are necessary in order to prevent crop failures. The mountains of Burma receive another deluge of rain from the monsoon which tears in across the Bay of Bengal. The mountain wall of the Himalayas deflects these air currents up the Ganges valley and a precipitation of fifty to eighty inches is



Winter Monsoons Summer Monsoons

RAINFALL IN INDIA

recorded over this area during the months of June to October. The rain comes in cyclonic storms of great intensity. Such a storm is followed by a period of calm, when the elements seem to be gathering their energy for another outbreak. The calm may last for ten days or more. During that time the farmers are busy planting their crops, such as rice, in order to be ready for the next downpour.

It will be noted that the rains decrease towards the headwaters of the Ganges valley. On the other hand the valley of the Indus receives little rain during any time of the year. This is due to the

direction of the air currents which, north of the Gulf of Cutch, blow along the shore with little force. The Indus valley slopes gently to the Arabian Sea and the winds which do blow inland have no mountain barrier at hand to drain them of their moisture. Winds which blow from the sea over hot lowlands become heated and such air absorbs moisture. Similar conditions are found during part of the year in the Orinoco valley of South America.

The retreat of the monsoon.—On the 22nd September the sun's rays are vertical over the equator, and during October the shorter days and the lessening angle of sunlight begin to have an effect upon the heated and rainswept areas of India. The precipitation decreases, many days are calm, the heat grows less. By November the dry season has definitely arrived.

India may be said to have three seasons: the cool, dry season of November, December, and January; the hot dry season of February, March, April, and May; and the hot, rainy season of June to October inclusive.

INDUSTRIES OF INDIA IN GENERAL

Agriculture is the chief occupation of the people of India. This is also true of Egypt, Mesopotamia, and China. It is true, in general, of all monsoon countries.

Rice is the most important cereal and bread grain. More land is devoted to rice culture than to any other single plant. It is grown wherever the land is flat and where the annual rainfall is forty inches or over; with less than this amount irrigation becomes necessary. The Ganges and Brahmaputra valleys are the chief centres of rice-growing. Some rice is grown on the narrow western coastal plain, and another rice area is found along the wider, eastern plain.

Wheat, barley, millet, and maize are grown in the Indus valley. In average years there is a surplus of wheat for export. Millet is the chief food of the people of north-west India. It is sown towards the end of the rainy season, and ripens as the heat and drought begin to bake the land. Maize is grown as a secondary food grain and as fodder for cattle in many parts of India where the rainfall is sufficient: i.e., thirty inches or over. Among some of the hill tribes maize is now the chief bread grain. Peas, beans, and other vegetables are often used as a second crop following the harvesting of the rice. Sugar-cane is grown in the irrigated section of the middle Ganges valley. India ranks next to Cuba in the amount of sugar produced. The supply of home-grown sugar is not suf-

ficient, however, and large quantities are imported from Java. The dense population of India makes it impossible to devote too much land to a crop such as sugar when other basic foods are none too plentiful.

To improve agricultural conditions the Government of India is undertaking various reforms. More land is being brought under cultivation, two crops a year are being grown on land where only one was raised before, pests are being exterminated, better seed is being produced and distributed to the farmers, and above all, steps are being taken to return fertility to exhausted soil. Both in urban and rural areas refuse is being saved to form compost to raise the humus content of the soil.

Irrigation.—One of the monuments to the British occupation of India is the development of great irrigation works in the dry regions of the upper Ganges and in the Punjab. At present 56,000,000 acres are under irrigation of some kind, either by canal, well, or tank. The division of the Punjab between India and Pakistan has left the more important irrigation works in Pakistan, which has brought hardship to many in the eastern Punjab.

It is not so long ago that the news of the day brought word of another famine in India. The failure of the rains over a large section of the Deccan or the Punjab meant that thousands of people died of starvation. Famine is always a threat in those areas of intermediate rainfall, twenty to forty inches. Good crops may be secured for a number of years; but a dry year means baked soil and no crop. Southern Saskatchewan and Alberta have experienced several dry years in succession, with much tribulation, even in these relatively thinly peopled districts. What then must it be like in a country as densely populated as India? As a result of the extension of the Indian irrigation systems, famines caused by drought have been considerably alleviated. There remains much to be done yet if famines are to become a thing of the past.

Canal irrigation in the Indus and upper Ganges valleys is on a very large scale. The British Government spent huge sums on irrigation works and the present governments are continuing and expanding this policy. The rivers which come down from the Himalayas have water in their beds no matter how dry the plains may become.

Wells are used in part of the upper Ganges valley and along the base of the mountains. These resemble the artesian wells of Australia.

Tanks are used in south-eastern India in the area of the Eastern Ghats. A small stream is dammed, the water collects, and a large pond or tank is formed. This is a method of storing water during the period of seasonal rain, and where the run-off is rapid. When the dry weather sets in and the small streams dry up, as they do in the Deccan, the tanks are called upon to furnish irrigation for the drying fields. However, in very dry years the tanks may not fill, and then there is distress. The largest of these storage reservoirs at Sukkur on the Indus, supplies water through canals for 8,000,000 acres.

Cotton occupies 26,000,000 acres of the precious Indian soil. It comes next in importance to rice, millet, and wheat. The cotton belt of India is in that portion of the Deccan where the weathered, black, sticky lava soils are found. Two varieties are grown, the native Indian short-staple cotton and American upland cotton. The former is grown in the Deccan, the latter is grown on the irrigated, alluvial soils of the upper Ganges and the Punjab. India used to export large quantities of raw cotton, but the cotton textile industry is being greatly expanded in an effort to make the country self-sufficient in cotton fabrics. Much of the weaving is carried on in the homes of the people on primitive looms, but there are hundreds of large, modern mills, many of which are in Bombay. Eventually India will be obliged to import raw cotton to supply the needs of its people.

Jute is grown for its fibre. It is one of India's valuable exports, and India enjoys almost a monopoly of the jute trade of the world, supplying about 87 per cent of the world's jute. The plant demands a hot, damp climate and rich soil. These conditions are found in the lowlands at the mouths of the Ganges. Jute is a plant which soon exhausts the soil, but the flooding of the rivers carries mud and silt over the lowland and helps to maintain its fertility. Over a hundred jute mills located in or about Calcutta manufacture the fibre into cloth and bags. Some of the fibre is exported to Dundee and Kirkcaldy in Scotland, where the linoleum trade is located. The partition of India separated the chief producing areas in eastern Pakistan from the manufacturing centre in Calcutta, India.

Flax is grown for its seeds. The flax fibre does not develop well in a hot climate, but a heavier crop of seeds is secured. These are pressed for their oil, which becomes the linseed of commerce. Other plants grown for their oil content are rape, mustard, sesamum, and peanuts. These grow where there is a medium rainfall in the hilly districts, as good drainage is essential.

Indigo and the opium poppy were once grown on a large scale and formed a very valuable Indian export. The discovery of coal-tar dyes has almost killed the indigo trade, and the Indian Government now regulates the production of opium in the interests of humanity.

Tea is a commodity which every one associates with India. It is grown on the hill-sides in districts having a heavy rainfall. Its culture requires cheap labour and in this respect it is similar to cotton. The principal tea districts of India are Assam Province in the Brahmaputra valley, and Darjeeling on the slopes of the Himalayas. Facilities are being prepared to make Calcutta a world tea market. The greater part of the tea crop is shipped to Great Britain.

Animal husbandry.—In an agricultural monsoon country it is often impossible to use machinery. The rice fields are too wet and it does not pay to use machinery in the cotton fields. In a country with so dense a population, man-power is often the cheapest form of labour. Many farmers cannot afford even one draught animal. Those who are able to do so use a bullock, a cow or a water buffalo.

The cost of supporting its huge cattle population is a great burden on the Indian economy. This is especially true since Hindu veneration for the cow prevents the people from using its flesh or milk as food. Prejudice and religious custom do not allow them to use cow-dung to enrich their fields, though fertilizer is so necessary in a land where two-thirds of the people are dependent on agriculture. Sacred cattle roam at will through market places where uncovered food is displayed for sale. It is estimated that the cost of maintaining superfluous cattle is four times the total paid in land taxes. The present government is establishing experimental farms and agricultural colleges where men are trained to teach farmers the rudiments of animal husbandry.

Goats are found almost everywhere. They can live on poor grass and shrubs where a cow would starve. The goats are milked, their wool is clipped, and their hides are sold. The goat is a familiar sight in and around every Hindu village. Sheep are raised throughout the Deccan and are grazed on land too hilly and too dry to support cattle. The wool of the Indian sheep is coarse and the yield is poor. A better grade of sheep is found in the Punjab.

Horses, ponies, and donkeys are used for riding purposes. There are many of these animals in the foothill country of the Himalayas and in north-western India. They are seldom used for draught

purposes as on our western plains. The camels of India are confined to the dry region of the Thar desert and the Indus valley.

Mining.—India is most fortunate in having coal measures of good quality. These are located 120 miles north-west of Calcutta and nearly 90 per cent of the total output comes from Bengal, Bihar and Orissa. Large deposits of iron ore and limestone occur near Sini, south of the coal mines, and large steel works have been erected at Jamshedpur. Steel rails and electrical machinery, chemicals, fertilizers, and explosives are made.

India also produces enough manganese for her own needs and for export, as well as tungsten and chromite, two other minerals much used in the manufacture of high grade steel. Copper and 80 per cent of the world's mica are found in India. Both of these minerals have many uses in the manufacture of electrical equipment, radios and television apparatus. India also mines graphite and various precious gems.

Manufacturing.—India's great advantages in manufacturing are its large supply of cheap labour, its coal of good quality, much potential water power, abundant supplies of raw materials such as food stuffs, fibres for textiles, hides and skins for leather goods, and the mineral wealth already mentioned. In addition there is the enormous home market of over 400 million people. As education is extended throughout the country, and as the development of manufacturing raises the standard of living, this home market will expand enormously.

In the past, owing to the poverty, malnutrition, ignorance and apathy of millions of its people, India has not made full use of its assets. Electrical power, for instance, has not been fully



Courtesy Government of India

BANGLE-MAKERS IN DELHI.

developed. Several plants have been put into operation, two of the oldest of these are near Bombay and on the Cauvery River in the south. More plants are being built.

The most important manufactures are those which use native raw products. Thus there are hundreds of cotton mills, jute mills and silk mills; flour mills and rice mills, sugar refineries; tanneries and leather manufacturies; oil mills to process the various types of oil seeds, tobacco factories and paper mills which use bamboo and the paper mulberry as the source of their pulp. Between Calcutta and Jamshedpur is the greatest concentration of 'heavy industries'—iron and steel plants and the industries which manufacture various articles from iron and steel.

Many types of manufactured articles not previously made in India are now being produced. Among these are ships, aeroplanes, locomotives, steel coaches for trains and busses, automobiles and trucks, machine tools and medical supplies. The great ports of Karachi, in Pakistan, and Kandla, Bombay, Cochin, Madras, Vizagapatan and Calcutta in India are being enlarged and their facilities for handling goods improved.

The partition of India introduced many problems in addition to that of finding homes and work for millions of refugees. Pakistan is largely agricultural, while the majority of the most important manufacturing industries are in the Republic of India. India was, on the other hand, cut off from several important sources of food and industrial crops, such as wheat, cotton and jute. These and many others problems must be solved before India can take her place as one of the great industrial nations of the world.

A more detailed study of India will now be made under the following headings:—

(1) The Ganges Valley.

(2) The Indus Valley.

(3) Peninsular India.

(i) The Ganges Valley

The cradle of Indian civilization is drained by a river 1,800 miles in length and having a basin estimated at 350,000 square miles. The larger part of the basin is a wide, flat alluvial plain lying between the Himalayas and the Deccan plateau. The plain slopes almost imperceptibly to the bay of Bengal. Agriculture is the chief occupation of the people.

The rainfall of the upper Ganges valley is generally less than forty inches per annum. When we remember the great heat that

occurs during the long summer it is easy to understand that this amount of rainfall is insufficient for crops other than millet. Even millet fails in a year of light rainfall.

Over half the crops are grown on irrigated land. Irrigation has transformed the upper Ganges basin into one of the most productive and one of the most densely populated parts of all India. It has 50,000,000 inhabitants.

Wheat and barley are grown as winter crops; rice is grown during the rains and with the aid of irrigation. Millet is the dry-land crop and the staple food of the people. Chick-peas and peanuts are also grown. Cotton of good quality is the important fibre crop. Sugar-cane is grown in the valley below Benares.

In this fertile alluvial plain over 65% of the land is under cultivation. Only 15% is waste land. The people live in small villages in houses made of mud and wattle. There is no forest, and wood is very expensive. The dung of animals is saved and used for fuel. Nine out of every ten of the population live by some means of agriculture. The towns are small in size when we consider the great population.

Delhi is the largest city and owes its importance to the fact that it is the capital of India. It is well situated with regard to the Indus valley on the one hand and the Ganges valley on the other. North of Delhi, on a spur of the Himalayas, is Simla, the summer hill resort (April to October).

Other Cities.—Meerut, to the north, and Agra, south of Delhi on the Jumna, are growing distributing centres for densely populated districts. At Agra is the celebrated Taj Mahal. Cawnpore, on the Ganges, is the largest city of the Doab[1] region. It is an important railway centre and has many small industries. Lucknow lies on the plain between the Ganges and the Gogra Rivers. It was once a capital city, but its importance is waning and its population is decreasing. Allahabad is situated at the junction of the Jumna and the Ganges and is growing rapidly. It is an important collecting and distributing centre and has a direct rail line running to Bombay. Benares, fifty miles below Allahabad, on the Ganges, is one of the ancient holy cities of India. It is a place of pilgrimage. The river is lined with palaces, temples, and sacred shrines. Flights of stone steps lead down to the water and pilgrims may be seen bathing in the holy Ganges. Pilgrims, priests, and 'fakirs' are everywhere. The narrow, winding streets are crowded with busy people and by

[1]The Doab is a fertile, irrigated plain between the Jumna and the Ganges.



Courtesy Government of India

The celebration of Indian Republic Day in Delhi.

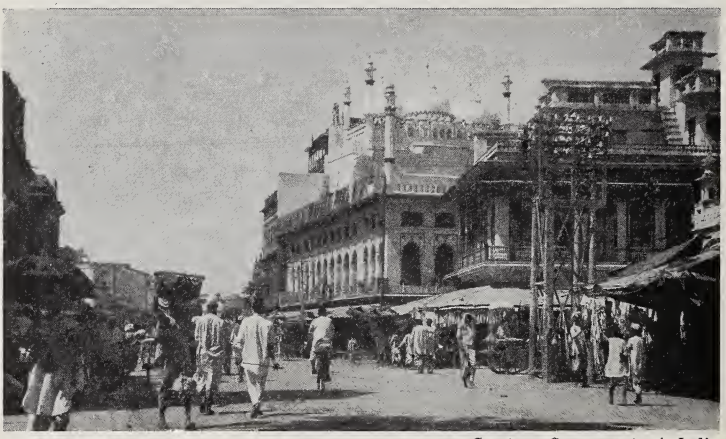
trains of camels, horses, and donkeys. Benares shows little change; it is the East, old and persistent.

The central Ganges plain has a rainfall of between forty and sixty inches per annum. Over one-third of the land is devoted to rice. The Biharis live in small mud-walled houses scattered through the fields. Patna is the chief city. It is a railway distributing centre for the rich rice lands.

The Delta of the Ganges.—In the lower Ganges plain the Brahmaputra and the Ganges unite and the combined waters enter the Bay of Bengal through a delta two hundred miles wide. The rivers divide into many channels and there are thousands of square miles of marshy land. This region is known as the Sundarbans. It is a forest jungle, wet, miry, and unhealthy, the haunt of the fierce Bengal tiger. The soil is a fine silt. Rice is the principal crop, and the Bengalis live in houses scattered over the fields and built on mounds of earth as protection against the time of flood. There are no roads through the delta. All the people use boats in transporting their goods to market. This plain is the centre

of the world's jute production. A few cities are located at favoured spots and there we find the rice mills and jute mills.

Calcutta, on the Hooghly branch of the Ganges, seventy miles from the sea, is the largest city in India. It is the great import-export centre of the eastern part of the country. West of Calcutta, at Asansol, there is the largest coal-field of India. The coal provides power to run the thousand and one factories which are found in and around the great seaport. Dacca is the principal city of eastern Bengal. It stands on the higher land between the Surma and Brahmaputra Rivers and controls the trade of that region.



Courtesy Government of India

A street scene in Allahabad, the 'Holy City' of the Muslims.

The Brahmaputra River rises on the northern slope of the Himalayas. It flows eastwards in a deep, narrow valley, finally breaking through the mountains and emptying its muddy waters into the Ganges delta. The province of Assam occupies the middle Brahamaputra valley. At this point the river flows west, barred from the sea by the Assam hills. The valley floor has an average width of fifty miles. The rainfall is heavy, over eighty inches per annum. Rice is the important crop throughout the valley, nearly 70% of the cultivated land being devoted to this cereal. The tea plantations on the gentle slopes come next in importance. Many thousands of people are engaged in the tea industry. Most of the Assam tea is exported.

(ii) The Indus Valley

The western part of the great plain of northern India slopes to the Arabian sea. The Indus River also rises on the northern side of the Himalayas and flows for many miles between the ranges before it breaks through to the plain. The valley of the middle Indus is known as the Punjab, one of the important provinces of India. Much of this region is now included in the Dominion of Pakistan.

The main stream of the Indus circles the plain, keeping rather close to the base of the mountains on the west. Between the mountains and the Jumna, five streams flow across the plains. Punjab means 'The Land of the Five Waters'.[1] Like many native place-names the term is well chosen. Without these streams the plain would be able to support but a few nomads, grazing their flocks of sheep and goats, or camels upon the coarse grass. But the melting snows of the Himalayas provide water for the rivers during the hot, dry summer. Millions of acres are under irrigation, thousands of wells are also used, and the Punjab has a population of 24,000,000 in an area of 105,000 square miles.

The larger part of the Punjab has an annual precipitation of less than twenty inches. West of Delhi the rainfall decreases rapidly from thirty inches in the east to five inches in the western part of the plain. A narrow strip near the Himalaya foothills receives enough moisture to grow millet without irrigation. During the summer the Punjab becomes burning hot, the July average being over 90° F. At this time the monsoon sweeps in along the flank of the Himalayas and the rivers become rushing, muddy torrents. But the rains are soon over in this part of India, the rivers shrink, and the plain wears its usual baked appearance.

Wheat is the premier crop of the Indus valley. It is sown on irrigated land in the fall and harvested in the spring. The land is then ploughed and seeded to millet, which is reaped in the fall. In this way two crops a year are secured. Maize is also grown, and with millet and wheat forms the chief food of the people. Much of the wheat is saved for export, by rail to Karachi. Cotton is also grown as a money crop. Very little is manufactured in the Punjab.

There are few large cities in this region, which is larger than the island of Great Britain. The people are almost all engaged in agriculture of some kind. They live in villages in houses made of mud and wattle, with flat roofs, a doorway, and often a mud-

[1]The Indus and its four great affluents—the Jhelum, Chenab, Ravi, and Sutlej.

walled courtyard. Lahore is situated in the central part of the irrigated area of the five rivers. Railways lead off to Peshawar and Karachi. Amritsar, a short distance east of Lahore, is the holy city of the Sikhs. It is noted for its carpet manufacturing, but is not as important as it once was.

The North-West Frontier Province occupies the mountain area between the Punjab and the plateau of Afghanistan. The monsoon has little effect in this section, the rains coming in the winter months, probably an extension of the Mediterranean winter rainfall area. The hills are bare and rocky. In the sheltered valleys the villagers grow millet and graze their flocks on the sparse herbage of the nearby slopes. The valley of the Indus is well cultivated, but the success of the crop depends upon the extent of the annual river flood. The vale of Peshawar is irrigated and is the most productive part of the province. Wheat is the chief crop. A railway runs up the Kabul River to Peshawar and beyond through the Khyber Pass which is strongly fortified.

The State of Kashmir borders the Punjab on the north. Agriculture is the chief industry, but sericulture, the raising of silkworms, is also an old and well-established occupation. Kashmir is a buffer state and at the present time is an area of dispute between the governments of India and Pakistan. It has strategic importance as it guards the frontier between India and Soviet Central Asia.

Baluchistan has a population of less than a million. As the sparse population would indicate, Baluchistan consists of barren mountains, deserts, and stony plains. The climate is one of extremes and the rainfall is scanty and uncertain. Millet, barley, wheat, maize, and potatoes are the chief food crops. Grapes, peaches, apricots, and melons grow well in the narrow, sheltered, irrigated valleys. Quetta is the one city. It controls the Bolan Pass. A railway extends through the pass to Chaman on the border. One hundred and fifty miles beyond is Kandahar, in Afghanistan.

The lower Indus valley is practically a desert. No crops can be grown without irrigation. The inhabitants of this section depend upon canals which carry water to the flat plain while the Indus is in flood. The canals go dry after the flood recedes. Only one crop a year can be grown. As in the Punjab, wheat, millet, and cotton are grown.

In order to remedy defects in the native irrigation system, the British Government built a great barrage across the Indus at

Sukkur. The barrage stores sufficient water to give perennial irrigation to 8,000,000 acres, as much as the total cultivated area of Egypt.

Karachi is the largest city of the lower Indus, and is the capital of Pakistan. It is situated at the western side of the delta, where a deep-water port has been made. Wheat, cotton, and oilseeds are the chief exports. Hyderabad, at the head of the delta, is an important trading centre.

The Thar or Indian desert forms the eastern border of the Indus valley. It is a rough waste of bare, rocky hills, sandy plain, and dry watercourses. Very few people live in this region. Caravan routes cross the desert from the Indus to the Aravalli Hills. Bikaner is the one large town. It is noted for the manufacture of camel-hair goods. Cotton textiles are also made. Rail lines connect with the Punjab, Delhi, Karachi, and Bombay.

(iii) Peninsular India

Let us now examine the great triangular mass of peninsular India. This will fall into three regions: the Deccan plateau, the eastern coastal plain, and the western coastal plain.

The plateau of the Deccan occupies the central part of the peninsula. It is higher on the western side, and the mountains which we call the Western Ghats are really the steep side of the escarpment facing the sea. Similar conditions are found in southern Africa. The plateau slopes towards the east, where a lower escarpment, the Eastern Ghats, drops down to a coastal plain.

On the north several ranges shut the plateau off from the Indo-Gangetic plain. In this part the rivers flow north-eastwards into the Ganges. The Narbada River flows westwards into the Gulf of Cambay, and the Tapti enters the gulf a few miles to the south of the Narbada. These two rivers are exceptions to the statement that the principal rivers of the plateau flow eastwards into the Bay of Bengal. Most of the rivers of the Deccan lend themselves to hydro-electric development where they fall from the plateau to the coastal plain. Dams have already been built on some of these rivers.

Part of the plateau is covered by the Deccan lavas. These have weathered into a black, fertile soil, and cotton is the chief crop. The rainfall is forty inches or less and millet is everywhere the principal bread grain. Cities are found at points along the chief route from Bombay to Calcutta and Bombay to Madras.

The Central Provinces, as their name implies, occupy the central part of the plateau region. If we compare them with the upper Ganges region we find that, although larger in area, they have a much smaller population. This is due to the difference in rainfall, and to the fact that very little of the land can be irrigated, so that much of it produces but one crop a year. Nagpur is the centre of a large cotton-spinning and weaving industry. Forestry is important, and coal and manganese are mined.

Hyderabad State is the largest and the most powerful of all the native Indian states. The ruler is called the Nizam. The growing of cotton is the chief industry of the people. Hyderabad City is well situated as the capital of a strong state and has rail connection with Madras and Bombay. The Golconda diamond mines are nearby.

Mysore occupies the highest part of the plateau. The Western Ghats are over 3,000 feet in height, and Mysore lies on a decided slope to the east, with the result that there is a light rainfall of twenty to thirty inches. The old crystalline rocks of this section do not yield a fertile soil, and agriculture is carried on under adverse conditions. Millet and cotton are the chief crops, sheep-raising is extensively carried on. Mysore is the old capital, Bangalore is the chief industrial centre. Silk manufacturing is important in these larger centres. Most of the gold mined in India comes from the Kolar mines east of Bangalore.

Madras Province began as a trading station at Nizampatam in 1611. In 1639 the English founded Fort St. George where Madras City now stands. During the ensuing two hundred years the whole of the east coast from Cape Comorin to the Orissa boundary was brought under British rule. Madras is one of the three great provinces of India both in size and in population.

The west coast, from Bangalore to Cape Comorin, has a very heavy rainfall—over eighty inches per annum. The climate is tropical, the January average being over 85° F.

Sand dunes border the coast and are covered with coco-nut groves. The flat, rich plain behind the dunes is irrigated by the small streams which flow down from the Ghats, and rice is grown on a large scale. The pepper tree thrives in this humid climate and the ports of Calicut and Cochin still export this commodity. It was to this coast that the early traders came for their shiploads of spices. The trade in coco-nut oil, copra, and coco-nut rope and mats now gives employment to many thousands.

On the east coast the Carnatic plains occur. This is the name given to the broad lowlands which lie between the edge of the Deccan and the sea, and which stretch in an unbroken line from Cape Comorin to the Kistna, a distance of 600 miles.

Sand dunes border the Carnatic coastline, and coco-nut groves provide a natural industry. Pearl fisheries are important off the coast of Tuticorin on the Gulf of Manaar.

It is interesting to note the difference in the rainfall over the Carnatic. It is much less than on the west coast, and comes during the winter months of October, November, and December. As these rains come at the end of the monsoon period in northern India they cannot be depended upon. There is also much variation in amount from year to year. As a result of the high temperature prevailing, a dry year means famine. However, water conservation has been carried out almost to the last available drop.

The valley and delta of the Cauvery River are noted for their productiveness. Madura controls the trade of the southern Carnatic; Trichinopoly that of the Cauvery valley.

Madras City is the only commercial port in the 600 miles of coastal plain. The harbour of Madras is today largely artificial. It is the third largest city in India. Railways run out through the plain to north and to south. Still other lines thread their way through gaps in the plateau, and draw part of the trade of the west coast. Mysore trades by rail with Madras; it has no choice in the matter. Cotton mills are important in Madras, and there are large tanneries.

That part of the province which covers part of the Deccan plateau is similar in its production to Mysore and Hyderabad. By far the larger part of the people live on the coastal plains.

The northern Circars region contains the deltas of the Kistna and Godavari Rivers. Much of this land is under irrigation. As we go north along the coast towards Orissa the rainfall increases and rice is again the chief crop. The seaports are small, and trade tends to flow by rail north to Calcutta or south to Madras.

The Province of Bombay.—Let us conclude our study of peninsular India with a view of the west-coast Bombay Province, which compares in many respects with Madras Province on the east coast. It joins Madras on the south and extends northwards along the coast to the lower Indus.

The larger part of the people of Bombay Province live on the coastal plain between the Gulf of Cambay and Goa. In this region the monsoon, sweeping in from the sea, breaks against the Western

Ghats and there is a rainfall approximating one hundred inches. This is the famed Malabar coast. Rice is cultivated on every acre of land suitable for this valuable cereal, and the rice district is densely populated.

A little to the north is Bombay City, on a small island snuggled against the coast. Here a great harbour has been built. Rail lines branch out to every part of India, and Bombay is the metropolis of the west coast. It is the first port of call for the mail and passenger liners coming by way of the Red Sea route. It is also a great cotton manufacturing centre and has over 40% of the spindles and 50% of the power-looms of India.

Summary.—Many of the points which have been noted in regard to present-day India are more remarkable than a casual survey would indicate. Let us take stock of some of the more important.

India is not a cultural unit like France or Germany. There is no language common to all districts. There are nine languages, each spoken by over 10,000,000 people. There are, in addition, thirteen languages, each spoken by more than 1,000,000 people. There are eight more dialects, each spoken by more than 300,000 people. The task of governing India is indeed a difficult one. The diverse tongues make it equally difficult to spread knowledge and culture among the people as a whole. To eliminate at least some of the language problem, a simplified language called Hindi is being taught throughout the whole Republic of India.

Another pertinent factor is the number of religious sects. There are Hindus, Buddhists, Sikhs, Jains, Christians, and Moslems. The adherents of the last-named are found chiefly in Pakistan, the Sikhs live mostly in the Punjab, the Hindus are everywhere. In addition, the Hindus are divided into castes.

British rule in India meant more than mere government. It meant much in the development of the country. We have noted that great dams and canals were built by British engineers, that millions of acres of land were brought under cultivation, and much of the fear of famine was driven from a large part of the great plain of northern India.

It is hoped that the new Indian government will find some solution to the problems that perplexed the British who ruled India for so many years.

Burma

As previously stated, Burma is now an independent nation, officially known as the Independent Union of Burma. Its inhabi-



Courtesy Government of India

HAVA MAHAL, AT JAIPUR.

tants are of Mongol descent, but are not a united people. Hill tribes differ in language and culture from those dwelling in the lowlands to the south. Chinese are numerous and control much of the trade. In addition, there are numbers of people from India, particularly in the south and along the Indian border. All these differences add to the difficulties of establishing a stable government. Eighty-five per cent are Buddhists and two-thirds of the people live by tilling the soil in one form or another.

Burma consists mainly of the river valleys of the Salween and Irrawaddy Rivers, which flow south to enter the Gulf of Martaban. The country is accessible only from the south, for great mountain barriers on the north, north-west, and north-east shut it off from China, Tibet, and India. The Irrawaddy, while not the longest of the Burmese rivers, is the most important. It provides nearly a thousand miles of highway and is navigable for most of that distance by large vessels. Its valley is the heart of Burma, and the capital, Rangoon, near its mouth, together with Mandalay, farther up stream, are the largest towns.

Rice, petroleum, and teak are the chief products; cutch (extracted from acacia bark and used for dyeing and tanning), rubies, jade, and coal are also produced.

Teak deserves more than a passing word, since Burma is the chief source of the world's supply. The forests are the property of the state and the right to cut timber is granted to companies who pay to the Government a royalty on exported logs. The teak tree, which usually grows in clumps, covers two-thirds of the area of Burma. It is girdled a year or two before being felled so that it may dry while standing; if cut down while green it may be buried or even destroyed by the dense tropical vegetation.

Teak is valuable for shipbuilding and for furniture. It is easily worked, and contains an oil which makes it immune from the attacks of insects.

The teak lands are vast areas devoid of anything resembling a road, and for six months of the year almost impassable owing to the torrential rains. Yet it is only during this wet season that logging is carried on. When the ground is dry, it is impossible to pull the heavy logs to the bank of the river. Machinery is useless in a country that is without roads and knee-deep in mud and water, but elephants solve the problem.

An average log contains seventy-five cubic feet and weighs about one and a half tons. It may be miles from the river and in an almost inaccessible place, but an elephant, harnessed to it, never fails to drag his burden through the mud and undergrowth down to the river bank. When the ground is cleared and level he may roll it with his tusks. The logs are then floated down stream to yards in the lower reaches of the river, where they are prepared for shipment to Europe and America.

These elephants cost about £400 each, and one company in Burma possesses two thousand of them. The annual loss through death is about 10%, the chief cause being anthrax. With ordinary good luck an elephant is at his best between fifty and sixty years of age and may easily go on to one hundred years. He eats from 600 to 700 pounds a day but fortunately is able to obtain it from the luxuriant wild growth in the neighbouring jungle. Elephants are also used in moving and piling logs in the yards at Rangoon and elsewhere.

There are 2,300 miles of railroad in Burma. From Lashio to Kunming the noted Burma Road provided an important military supply route into southern China during the second World War.

The Dominion of Ceylon

Ceylon, the Taprobane, or 'Island of Dusky Leaves', of the ancients, is detached from southern India by Palk Strait and the



Courtesy Wheeler Newspaper Syndicate

The children of Burma look after their younger brothers and sisters while their parents work in the fields.

Gulf of Manaar. In 1505 the Portuguese formed settlements on the west and southern coasts but were forced to give them to the Dutch a century and a half later. In 1796 the island was ceded to Great Britain and attached to the Presidency of Madras. It became a crown colony in 1801 and was granted full Dominion status in 1948.

The northern half of Ceylon is comparatively low, but the hills rise gradually towards the centre where there are mountains over 7,000 feet high. The winds coming in contact with the hills have a double rain effect. The south-west monsoon brings rain from May to September, and the north-east monsoon from November to February. In the west and south-west the rainfall is heavy and a luxuriant tropical vegetation flourishes. In the north, with less moisture, grasslands are the rule.

Agriculture ranks first as an industry. Over 62% of the people are engaged in it as compared with about 30% in Canada. About 3,200,000 acres are under cultivation. One-quarter is in coco-nut groves and an equal amount in paddy, with the rest in rubber, tea, grain, cacao, and cinnamon. Despite the large acreage in rice the amount produced is not sufficient to supply domestic requirements, and a large amount is imported. Cotton goods, sugar, and coal are other imports.

Since 1940, the government has embarked on a policy of industrialization. Factories now produce textiles, processed coco-

nut oil, steel, caustic soda, cigarettes, glass, rubber goods, and a variety of other products. Cottage industries produce reed mats, coir goods, handloom textiles, lacquerwork, and products of a similar nature.

The first stage of a government sponsored hydro-electric scheme is expected to provide sufficient power for Ceylon's industries.

Graphite is the chief mineral exported, but precious stones, including sapphires, rubies, moonstones and cat's-eyes, are also of value.

Colombo, the capital and chief port, is situated on a splendid artificial harbour on the west coast. It is a port of call on the trade route from Europe, via the Suez Canal to Oriental and Australian ports. Kandy is the ancient capital and a hill resort.

Maldive Islands

This group of many small islands, 400 miles to the south-west, is now a British protectorate. They are richly clothed with coconut palms and yield millet, fruit, and nuts. The inhabitants, almost entirely Mohammedan, are great navigators and traders. Fishing and coir making are the chief industries.

EXERCISES

1. The whole life of India depends upon the coming of the monsoon rains. Why is this so?

2. What are the three most important crops of India? Where is each grown and why?

3. India has more cattle than any other country in the world, yet dairying is almost unknown and beef is not used for food. To what uses are the cattle put?

4. The Ganges valley supports a population greater than that of the whole of North America north of Mexico. Ninety per cent of these people live off the land. What conditions make this possible?

5. It must be remembered that wheat in India is a winter crop. What is meant by this? Why is this so?

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SOUTH-WEST ASIA

Syria, Lebanon, Palestine, Arabia, Iraq, Iran (Persia), Afghanistan

South-West Asia

Afghanistan, Iran, Iraq, Syria, Palestine, and Arabia are included within this area.

The south-western part of Asia consists of a high plateau on the north which extends from the Aegean Sea to the Suliman Range of Baluchistan. In the south is the high plateau of Arabia. Between these plateaux a broad lowland extends from the Mediterranean to the Indian Ocean. Seven countries are within this area, sometimes called 'The Land of the Five Seas'.

CLIMATE

Over the whole region the climate is dry and hot, except where elevations of 3,000 to 5,000 feet cause a cold winter season. What rain there is comes during the winter months. During the summer a vertical sun parches the grass and bakes the land with an intense heat. In its natural state south-western Asia is a pastoral region where nomadic tribes tend their flocks of sheep, goats, or camels, moving from place to place in search of fresh herbage. The coastal plain of Syria and Palestine has a larger precipitation than the rest of Asia Minor, and there the vine, the olive, oranges, bananas, and figs are grown. Arabia is a plateau sloping towards the east. This causes a desert which extends northwards to Syria. The plain of Iraq is as dry as the basin of the lower Nile. Where irrigation is practised almost anything may be grown in abundance. The plateau of Iran is as dry as Arabia, but the high mountains collect sufficient snow and rain to fill the small streams which flow down their flanks. Thus Iran is a series of oases or irrigated tracts with barren areas separating the one from the other.

SOUTH WEST ASIA
(MIDDLE EAST)
LAND OVER 3000 FT.
" UNDER "
SCALE
0 100 200 300 400 500
MILES
SOVIET UNION
CHINA
INDIA
IRAN
AFGHANISTAN
PAKISTAN
TURKEY
IRAQ
SAUDI ARABIA
SYRIA
ISRAEL
JORDAN
EGYPT
YEMEN
ADEN
OMAN
KUWAIT
BAHREIN IS.
QATAR
ARABIAN SEA
RED SEA
PERSIAN GULF
GULF OF ADEN
MEDITERRANEAN SEA
BLACK SEA
CASPIAN SEA
ARAL SEA
Istanbul
Ankara
Tiflis
Tigris R.
Euphrates R.
Damascus
Jerusalem
Cairo
Suez Canal
Aqaba
Baghdad
Tehran
Basra
Kuwait
Riyadh
Mecca
Aden
Muscat
Kabul
Quetta
Karachi
Indus R.
Delhi
Ganges R.
Bombay
Nile R.

Syria

This region was formerly a mandate of France, but it is now an independent republic with the capital at Damascus. The western slope of the Lebanon Mountains is a fertile fruit growing area. The olive is grown extensively and large quantities of olive-oil and soap are made. Syria is an agricultural country, although it is still undeveloped even in this respect. Only about one-fifth of the arable land is at present under cultivation. Orange groves near Beirut, vineyards at the western section and sericulture (silkworm raising) and cotton growing are listed among the chief agricultural pursuits of the people. Sheep raising and cattle breeding are also important occupations. Eastern Syria slopes to the Tigris-Euphrates river basin and, for the most part, it is a desert.

Damascus is the old caravan centre of ancient days. The caravans still outfit from Damascus, but the larger part of the trade is conducted by railway. The city is a shopping centre for all who can reach it. It has many small handicrafts; shops and bazaars are filled with articles dear to the heart of every Syrian farmer or herdsman. The city is in the centre of the plain which irrigation has made like one great fertile garden.

Lebanon

Lebanon, once part of the French mandate of Syria, is now an independent republic. It forms a strip 120 miles in length and about 30 miles in width along the Mediterranean coast. Since it has a Mediterranean-type climate, the chief products are olive oil, citrus fruits, wool, silk and cotton. Beirut is the capital and chief seaport.

Palestine

After 30 years of British rule the mandate of Palestine was divided into a Jewish and an Arab state. The period was marked by violent outbreaks between Jews and Arabs. In 1948 the United Nations recognized the Jewish state of Israel. It includes the southern and northern portions of Palestine and a strip along the seacoast, with a total area of some 5,500 square miles. The Arab state includes the central portion of Palestine, which surrounds Jerusalem. Unfortunately, the dispute has not yet been settled to the satisfaction of either Jews or Arabs.

The structure of Palestine is similar to that of Syria. On the plains of Sharon, Philistia, and Esdraelon, which slope to the sea,

the usual Mediterranean fruits and plants are found. The Jaffa district is noted for its oranges, grapes, and sesame. Cotton is grown in the vicinity of Tiberias and Acre and there are fine wheat fields in the Esdraelon plain.

The most remarkable feature of the country is the rift valley of the Jordan, Sea of Galilee, and Dead Sea. This valley is a continuation of the rift valley system of Africa and may be traced through the Red Sea and on to Lake Rudolph in Kenya. The Jordan River follows the course of the valley to the Dead Sea, which is 1,290 feet below sea-level. The waters of the sea are so heavily impregnated with mineral salts that nothing can live in them. The extraction of these salts from the sea water is providing an important source of income. The plains of western Palestine are used for grazing purposes.

Jerusalem.—By the United Nations plan the Holy City of Jerusalem was to be an independent city with local autonomy over an area of 289 square miles, but its status has not yet been satisfactorily settled. Jerusalem is the great and historical city of Palestine. It was here that Christ flogged the money-changers out of the temple and it was on the Hill of Calvary, nearby, that He was crucified. The city still has its old walls and battlements. The streets are narrow and the houses crowd close together. The situation of Jerusalem on the plateau, between the sea and the rift valley, was originally chosen for the sake of security. There is little else to recommend it. Before the second World War it was an important trading centre for the people of Palestine. The tourist trade was considerable, since Christians, Jews, and Mohammedans all look upon it as a holy city.

Tel-Aviv is a modern city and the centre of the Jewish colonization programme. The constitution of Israel characterizes the country as the national home of the Jewish people and the Government encourages the immigration of Jews from all parts of the world. The colonies are changing the face of Palestine. A power plant on the River Jordan is supplying electricity and water for irrigation. Small industries are being established here and there to give work to the increasing population.

Trans-Jordan is an independent state which was formerly part of the Palestine mandate. The country is chiefly desert except for a fertile strip along the Jordan River. Agricultural and pastoral industries are the chief interests of its people.

Arabia

The peninsula of Arabia is a plateau of about 1,000,000 square miles. It is made up of several states of which the kingdom of Saudi Arabia is by far the largest. The inhabited regions are mainly in the coastal strip around the edge of the plateau. These receive a little rain. The province of the Hejaz includes north-western Arabia and contains the holy city of Mecca, which thousands of pilgrims visit each year. These pilgrims come from every country, such as northern Africa, western Asia, and India, where the Mohammedan religion flourishes. The kingdom of Yemen, in south-western Arabia, has a short monsoon rain-cycle in the summer enabling coffee to be grown. It is exported through Mocha. The British colony of Aden, a little over a hundred miles from the Strait of Bab-el-Mandeb, is a British coaling station on the Red Sea route. Because of its position it is a collecting and distributing station for all kinds of trading goods. Oman, in south-eastern Arabia, is a small independent state. It is noted for dates of fine quality which are exported through Muscat. The Persian Gulf is the centre of pearl fishing. The country of Nejd occupies central Arabia. The people are grouped around a few oases; beyond these the shepherds tend their flocks.

The discovery of oil in that part of eastern Arabia bordering the Persian Gulf, and on the Islands of Bahrein, an archipelago off Arabia's east coast, has brought a new source of wealth to these Arab kingdoms. The oil wells are worked and the oil refined by United States and British oil companies, but as in Venezuela, they pay royalties to the states where the oil is found. Moreover, many Arabs find work in the refineries and along the pipelines.

Iraq

Iraq is an Arab kingdom, until recently under the protection of Great Britain, but now independent. It includes the valleys of the Tigris and Euphrates Rivers, and the country once called Mesopotamia. In the upper part of these valleys a rainfall of fifteen inches makes it possible to grow wheat and barley. Where tributary streams permit of irrigation, maize, rice, and cotton are grown. Much of the land between the rivers is a grazing region. From the point where the rivers join, down to the sea, irrigation is necessary. Throughout the lower courses of the rivers and the Shat-el-Arab, the date palm is the chief source of sustenance and of wealth. On the irrigated lands are rice, fruit, barley, and cotton, and it is estimated that by further irrigation another seven million acres



Courtesy United Kingdom Information Office

THE HABBANIYAH FLOOD CONTROL SCHEME.
When this flood control and storage scheme is completed, Iraq will have one of the finest irrigation systems in the world.

could be brought under cultivation. There is a considerable export of dates and wool.

Important oil fields are found at Kirkuk and Khanaqin, and other wells being brought into production are increasing the annual yield. Pipelines from Kirkuk to Haifa and Tripoli make this oil available to Mediterannean shipping.

Mosul is the principal trading centre of the upper valley. Baghdad is situated at the meeting-place of caravan routes from Syria and Iran. It is a mart for goods of every kind, both of European wares and of native products. Basra, on the Euphrates, is the port of Iraq. It is situated at the head of navigation for ocean ships. Small river steamers go up to Baghdad.

In 1940, for the first time, it was possible to go by rail from Basra to Ankara, thus completing the Baghdad railway started by the Germans nearly 30 years before. Under British rule the old irrigation ditches were opened, dams were built across the river, and the area of irrigated lands was gradually extended. The time is not far distant when the population of Iraq will exceed that of Egypt.

Iran (Persia)

The plateau of Iran is one of the world's great waste spaces. Many parts of it are a veritable 'Sea of Mountains', with dry watercourses and barren mountain slopes. It covers an area of more than 600,000 square miles. Within this region some 15,000,000 people are living. This is possible because of the conservation of every drop of available water from the hills for irrigation purposes, since the rainfall over the larger part of Iran is less than ten inches. The irrigated tracts are like oases, being separated from one another by miles of range land or semi-desert. Every available foot of soil is made to produce, so that the oases look like green gardens. Among the crops are cereals, cotton, tobacco, the poppy, melons, grapes, tree fruits such as plums, peaches and apricots, as well as dates. In the north, where the mulberry tree grows, silk is produced. On the hill slopes nomad herdsmen tend flocks of sheep, goats and camels. These supply the raw product for the beautiful carpets and shawls for which the country is famous.

Iran has the most important oil fields in the Middle East. These were worked by British and American interests until the Iranian government nationalized the oil fields and expelled the British technicians in 1951. Pipelines carry the oil to Bandar Shapur and Abadan on the Persian Gulf.

Within recent years a railway has been built from Abadan and Bandar Shapur through Teheran, the capital, and on to Bandar Shah on the Caspian Sea. Teheran is a beautiful city, modern in many respects, with wide streets and fine buildings.



Courtesy United Kingdom Information Office

Abadan, Persia.
The site of the largest oil refinery in the world.

Afghanistan

Afghanistan is a mountain state, occupying the eastern part of the Iranian plateau. Most of the 245,000 square miles are suitable only for pastoral pursuits. In this occupation as in that of brigandage the Afghan has long been famous. The valley of the Oxus is a fertile lowland region. The irrigated parts along the small stream valleys produce crops similar to those of Iran. Kabul is the capital, near the western end of the Khyber Pass.

Conservation in Asia.—From Singapore to the Bering Strait and inland to the Urals and the Caspian Sea one could find all types of soil, climate and vegetation. The tremendous populations of some Asiatic countries make conservation a vital subject. Where millions live in daily fear of death from starvation, wise use of the land becomes a major issue of government policy. In some Asiatic countries, however, lack of stable government and of mechanical techniques have slowed down progress in conservation. The present tremendous strain on the natural resources of Asia accounts for much of the unrest and pressure in Asia today.

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PART FIVE: Africa

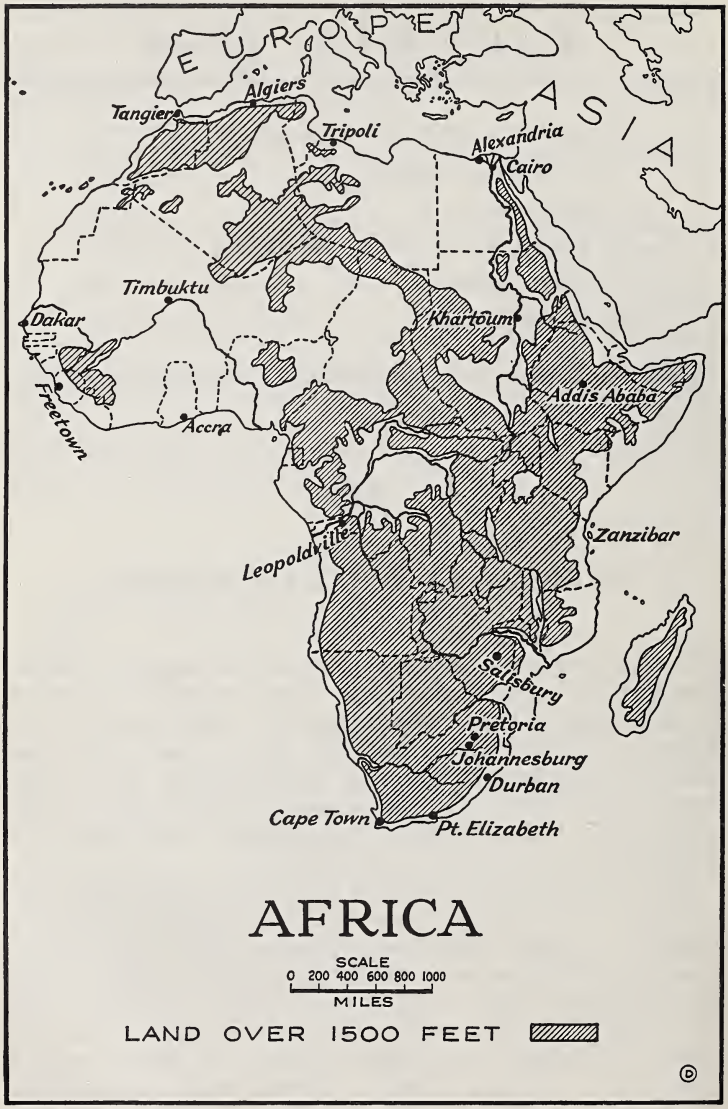
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AFRICA — GENERAL GEOGRAPHY

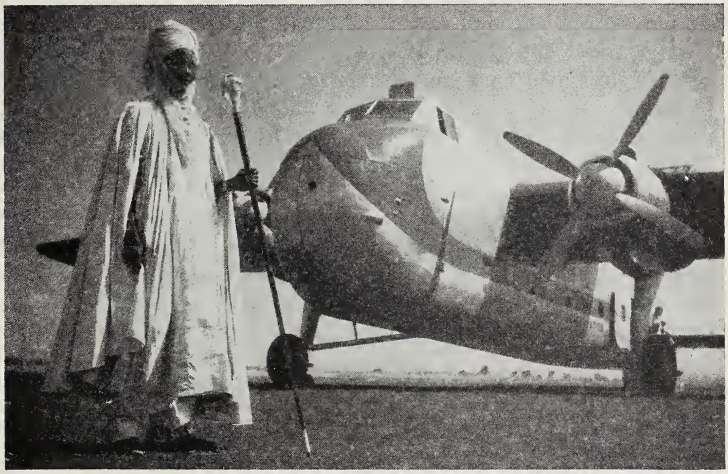
A land of romance—the home of the Berber, the negro, and the lion, with the largest desert and the largest plateau in the world. It is also a land of vivid contrast, from the sunshine and heat of the Sahara to the tropical rain-forest and gloom of the Congo basin. Africa has long been known as the 'dark continent', and has only been opened to the light of trade and commerce within the last eighty years. It was the last of the continents to succumb to the penetration and dominance of the European.

The reasons for this are found in a study of the build of the continent. The map will show that the coastline of Africa is remarkably regular. This feature becomes more apparent as we compare it with Europe or with North America. Good harbours are few and far apart. No large bays or gulfs run into the land, no navigable riverways lead directly into the heart of the continent. The relation of coastline to area is one mile of coast to every 700 square miles of surface. Europe has one mile of coastline for each 190 square miles of surface. We may say that no part of Europe is far from the sea or from a good harbour, but


EUROPE
ASIA
Algiers
Tangier
Tripoli
Alexandria
Cairo
Timbuktu
Dakar
Khartoum
Addis Ababa
Freetown
Accra
Zanzibar
Leopoldville
Salisbury
Pretoria
Johannesburg
Durban
Cape Town
Pt. Elizabeth
AFRICA
SCALE
0 200 400 600 800 1000
MILES
LAND OVER 1500 FEET

many parts of Africa are far inland and approach to the coast does not guarantee a harbour. This, then, has been the first bar to trade with rest of the world, and for centuries on end the vast interior of the continent remained unexplored and in veritable darkness.

Africa has a narrow coastal plain. It is a continent which has been thrust up above the sea *en bloc*. Everywhere a rough and often precipitous escarpment faces the sea, rising, in places, to an altitude of 7,000 feet. Beyond the escarpment the land slopes inwards, as in the Sahara, the Congo, and the plateau of South Africa. Apart from the Nile, the rivers circle through the plain, descending by falls from level to level, and finally break through



Courtesy United Kingdom Information Office

The Lamido of Adamawa welcomes the United Nations Mission, arriving by plane to visit his land.

the escarpment to the sea in a swirling cascade of tumbling waters. A foothold on the coast at some river mouth does not mean that we shall find a trade route into the interior, and possession of a river mouth is of slight value if the river itself is impassable. The escarpment has been a second factor blocking the natural intercourse of the coast with the interior. Millions of the native inhabitants have grown up in complete ignorance of the outside world.

The nature of the African rivers is determined by the escarpment. In no other continent, Australia excepted, are the rivers of such little value as carriers of trade. The Nile cannot compare with the Rhine or with the Mississippi. The Niger and the Congo are poor counterparts of the Amazon and Paraná, and the Zambesi

will not bear comparison with that great highway of commerce, the Yangtze Kiang of China. The Nile and the Congo have lake sources, falls, and cataracts, but there we may end any comparison with the St. Lawrence of North America.

On the other hand, such rivers make possible enormous hydro-electric development and may be the key to untold wealth for Africa in the future. No other continent has such hydro-electric potential.

Africa is a land of plateau areas. It is only in the extreme northwest and in the extreme southern tip that ranges of folded mountains are found. The Atlas Range is really a part of the folded mountain system of southern Europe. The Strait of Gibraltar is a sunken portion through which the ocean floods the Mediterranean basin. The Cape ranges cover a small area and a few unimportant streams drain their parallel ranges. Africa has no primary highland. The high peaks of Kenya and Kilimanjaro are volcanic cones standing upon a high plateau whose elevation has been still further increased by lava outpourings of other days. The mountains of Ethiopia are of similar formation.

The extent of the continent is reflected in the size of the four great plateaus. The Sahara is the largest and exceeds 3,000,000 square miles in area. It is one of the driest regions of the earth and throws its giant blanket of sand and bare red rock across the continent from the Atlantic to the Red Sea and from the Mediterranean to the confines of the Sudan.

The Congo basin lies south of the Sahara. It is shaped like a great bowl with the ridge of the Cameroons on the west and the Ruwenzori Range on the east. Much of the middle Congo is less than a thousand feet above sea-level, but towards the south the land rises gradually to the water-parting that separates it from Zambesi. The Congo basin may be considered to have an average elevation of 3,000 feet and an area of 1,500,000 square miles.

The plateau of South Africa is even larger in area and includes that portion of the continent south of the Congo Basin. Its average height is between four and five thousand feet, and on each side it presents a bold-faced escarpment towards the sea.

Eastern Africa rises to the plateau of Ethiopia, seven to nine thousand feet in altitude, the highest portion of the continent. No large streams flow down to the ocean, for here, as elsewhere in Africa, the long slope is inland and the Atbara, Blue Nile, and Sobat drain into the Nile. Ras Dashan, 15,160 feet, is the highest mountain in Ethiopia. Further southward there rises from the

eastern tableland the volcanic cone of Kilimanjaro, 19,710 feet, the highest mountain in Africa. It is well named 'mountain greatness'.

The rift valley of Africa is one of the world's wonders. We may trace it on the map by the long narrow lakes which occupy the deeper parts. It is thought that a faulting occurred during the time that the great tableland of Africa was being pushed up above the sea. Now the steep rock walls of the rift valley rise several thousand feet above the portion which either cracked off and dropped down or else remained constant while the adjacent land was forced upwards. Lake Nyasa floods the southern end of this valley, and as we go go northwards we find that the valley divides into two parts. The western branch includes Lakes Tanganyika, Kivu, Edward, and Albert, and the valley of the upper Nile as far as the entrance of the Sobat. Beyond this point it disappears, although the lower Nile may occupy a slight local fault which originally directed the course of the river. The eastern rift valley has been traced northwards around Lake Victoria and across Ethiopia. The Red Sea occupies the next section of this great fault which may be traced through the Gulf of Akaba and on to the Dead Sea and the Jordan valley. It is finally lost in the flank of Mount Hermon, a distance of 3,500 miles from Lake Nyasa.

Lake Victoria lies between the arms of the rift and drains into Lake Albert. It is the largest of African lakes, and stands next in size to Lake Superior.

The influence of the Equator.—The position of Africa in relation to the Equator and the land mass of Eurasia determines the climate of the continent. Certain broad features may be enumerated which will give a general view of the African belts of vegetation. Africa is more evenly balanced on the Equator than is South America, and very little of the total land mass extends beyond the tropics. For this reason the climatic zones north of the Equator are repeated south of the Equator. These are:

1. The Mediterranean climate of the Barbary States on the northern slope of the Atlas Mountains, with rain from November to March.

2. The Sahara or northern desert country, with a rainfall of ten inches or less, but with underground water and fertile oases.

3. The Savana or Sudan belt, with summer rains when the heat of the Equator is drawn north by the overhead sun.

4. The equatorial belt, with rain each month of the year.

5. The Savana region south of the Equator, with rain in the southern summer and vast grassland areas.

6. The Kalahari or southern desert land, with little or no rain and with little underground water.

7. The Cape section, of Mediterranean type, with rain from May to September, the southern winter season.

The people of Africa live in one or another of these climatic belts and must adjust their lives to the conditions imposed upon them by nature. We shall study each of these regions and find out how the people are living, what the industries are, and what political divisions have been made.

Today the whole of Africa is in as great a ferment as was England during the time of the Industrial Revolution. A whole continent is changing overnight.

White people, unfortunately, sometimes think of the African natives as peoples without culture or any form of organized government. This is quite wrong. While all African peoples were by no means equally developed, those living in the most productive regions had a very ancient culture. They had a keen artistic sense, as shown in their carving and pottery, and their use of colour and design in decorating their houses and their utensils. In musical ability, they excelled all other primitive peoples. Their tribal organization was effective, and they exhibited a strong sense of justice.

Today, tribal customs are almost everywhere breaking down, and the natives, in thousands, on plantations, in mining communities, and in manufacturing towns, are being thrust into a way of life for which they are totally unprepared. Some effort is being made to educate Africans to choose what is best from both the old and the new, but much more remains to be done.

From desert to jungle, Africa has been considered a source of raw materials by European countries for over a hundred years. Belgium, Portugal, France and Britain still have immense colonial holdings in Africa and large native populations to administer. From these lands they require crops which cannot be produced in cooler climates, notably sugar, cotton and vegetable oils.

Colonial policy can no longer be based on ruthless exploitation and natural resources must be protected. Rivers have to be controlled for power, navigation and irrigation. Crops and cropping methods suitable to tropical soils must be found, and diseases have to be controlled without upsetting the balance of nature. All these are matters of major concern to the great colonial powers.

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NORTH-EAST AFRICA

Egypt, The Anglo-Egyptian Sudan, Ethiopia

Egypt

If we had our choice of places to visit in northern Africa, we should probably decide on a trip to Egypt, where there is still so much to see of the remains of that ancient and wonderful civilization. We should find that today there are 19,000,000 people living along the valley of the Nile between Aswan and the sea. There they cultivate a narrow ribbon of land five to ten miles wide, which widens to 150 miles in the Nile delta, below Cairo. The cultivated land of Egypt amounts to 13,600 square miles, two-



Courtesy, B.O.A.C.

Arabs pause beside the Great Sphinx and Great Pyramid.

thirds of which is found in the delta province. The population density is 1,700 to the square mile, a remarkable number for a purely agricultural people. Beyond the ribbon of cultivated land the sands of the desert stretch back to the bare red rock of the distant hills, and beyond these the undulating sand dunes of the Sahara billow on to the sunset.

Egypt is truly 'The Gift of the Nile'. If we can find the reasons for that statement we shall understand the nice adjustment which the people of Egypt have worked out in their long struggle with the forces of nature on the edge of the Sahara. The Nile rises in tropical Africa and issues from the catchment basin of Lake Victoria as a strong, steady stream. It joins with the waters of Lakes Edward and Albert to form the White Nile which flows sluggishly through the Sudan country to Khartoum. During its course it is joined by the Bahr el Ghazal from the west and by the Sobat from the east. At Khartoum the Blue Nile flows in from the Ethiopian highland, and farther down stream the Nile is again augmented by the Atbara or Black River. At this point the Nile reaches its maximum size and volume, no tributary stream being found during the remaining 1,600 miles to the sea. Loss from evaporation by the fierce heat of the sun and by seepage into the thirsty soil causes the river to decrease in volume, and it is actually smaller at Cairo than it is at Berber.

There would be no flooding of the Nile if it depended entirely upon the lakes and the Bahr el Ghazal for its source waters. The floods are caused by tributaries which come down from Ethiopia. The south-east Trade winds bring rain to the highlands during the summer. The steep slopes of the bare and rocky mountain-sides give a quick run-off, and within a few hours the Atbara will change from stagnant pools and glaring shingle to a rushing, foaming, muddy torrent, a thousand yards wide. Below the Blue Nile the flood rushes over the sixth cataract, and below the Atbara are five other cataracts, over which the waters foam and boil as they fall between the high rock walls. The flood reaches the fertile lowlands towards the middle of June, and rises to its maximum level within ninety days. During October the flood rapidly recedes, and the river is within its banks by November.

The rise at Cairo is from twenty-five to twenty-seven feet, and the flooded Nile spreads over the fields until it resembles a long narrow lake. Back from the river, the houses of the fellahin are seen standing on little islands of soil which have been heaped up above the flood-levels. The stagnant water deposits the silt which has been brought down from the highlands, and this forms a fine

coating of mud on the fields. It is believed that this enriches the soil and helps it to maintain its wonderful fertility. When the floods recede the hot sun dries the surface soil, and the farmers plant wheat, barley, clover, beans, and vegetables. These are known as winter crops and mature without any further irrigation. The autumn crops of rice and maize are sown before the Nile floods and the warm shallow water causes rapid germination and growth. Summer crops of cotton and sugar-cane are grown on those areas which can be irrigated regularly throughout the growing period. There is a large acreage devoted to cotton in the delta. Cotton is also grown in the irrigated lands below the Aswan dam; this district is known as upper Egypt, and a large amount of sugar-cane is produced.

The majority of the inhabitants are dependent upon agriculture in some form for their living. This is impossible without intelligent labour and strenuous work. Even then, the population is so large for the small habitable area, that there is little margin or surplus for each person.

The Aswan dam.—In order that the precious life-giving Nile water might be conserved and that more land might be brought under cultivation, British engineers completed a huge dam of stone and concrete across the river at Aswan in the year 1902. Aswan is at the foot of the first cataract. The dam is over 6,000 feet in length and has been raised to a height of 143 feet, confining and piling up the waters of the Nile in a lake 200 miles long. High-level canals extend along the edge of the valley below Aswan, and several million acres are now under perennial irrigation. Two crops are now produced each year where formerly there was only one crop, and in some places none at all.

The flood-gates of the great dam are placed at the bottom so that the silt may be washed through them, otherwise the lake would soon fill up with mud. The impounding of part of the Nile flood-waters has a further value. When the Nile has fallen to its low stage during February and March, the water from the Aswan lake is gradually released and the level of the lower Nile is retained at a reasonable height so that the many small irrigation devices of the native Egyptians may continue to function.

Low barriers, known as *barrages,* have been built across the river at Esna, Asyut, and Cairo. These also help to regulate the height of the water, particularly in the spring and early summer during the period of low Nile. Yet with all these aids of the engineer's skill, the native Egyptian continues to irrigate large

areas which lie just a few feet above the barrage levels. They do this in the old, primitive way, using the *shaduf* and the huge water wheel. Population presses on the land and the desert is ever ready to encroach on the hard-won fields and groves of date-palms. The *shaduf* is worked on the principle of the old-fashioned well-sweep, and hour after hour, day after day, the labourer pours his bucket of water into his irrigation ditch. The water wheel is turned by oxen and is used by the more prosperous farmers.

The main money crop of the Egyptian is cotton. It is the one great crop which may always be sold or traded and will thus buy those things the Egyptian farmer needs. Its value amounts to 80% of the total exports. Egyptian cotton is a long-staple variety and is used in making the finest muslins and in the manufacture of cord tires for automobiles, where strength is needed.

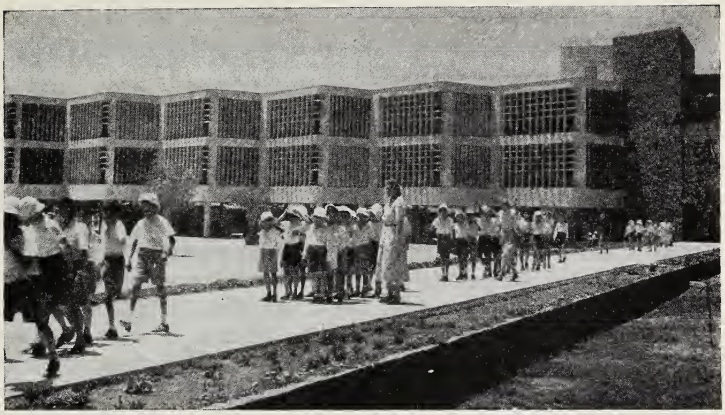
We may conclude that the people of Egypt buy, from the proceeds of the sale of the cotton crop, the goods and manufactured articles which they need. Some sugar cane, maize and onions are sold, but the larger part of these crops is used locally. The Egyptians are mostly vegetarians and grow a large amount of garden truck for their own use. Groves of date palms fringe the river banks, and dates are an important article of the Egyptian diet.

Egypt has oil wells near the Gulf of Suez and the oil is refined in the Suez refineries. Manganese and phosphate are also produced, and a beginning is being made in the manufacture of cotton textiles and of tobacco for cigarettes.

The lack of coal and iron, and the hot climate, make large scale manufacturing difficult, and the needs of the people are largely supplied from northern Europe. These are, in order of their value, cotton goods, metals and machinery, wood and coal, chemicals, oils, paper, books, and tobacco.

Alexandria is the chief seaport of Egypt. It is located on firm land at the western edge of the Nile delta. Alexandria is an old city and for two thousand years has controlled the export-import trade of Egypt. There you will see the wharves piled high with bales of cotton awaiting export to Europe.

Cairo.—A railway runs across the delta to Cairo, the capital of Egypt and the largest city in Africa. The Egyptian is a true follower of Mohammed, and the numerous mosques with their tall minarets bear witness to this fact. Many of the streets are narrow, evil-smelling by-ways; those in the newer part of the city are broad, well-paved thoroughfares. Cairo presents every grade of construction, from magnificent public buildings and museums to



Courtesy United Kingdom Information Office

THE NEW VICTORIA COLLEGE AT CAIRO.

The buildings are raised on stilts to give extra shaded space and to allow free circulation of air through the site.

the mud-walled huts of the destitute; every shade of colour, every variety of tongue. The bazaars or shops are thronged with visitors as well as natives, and the merchants will sell you anything from Persian rugs and stone water-jars to antique carvings and jewellery of curious workmanship. Antiques from the tomb of Tutankhamen or some other worthy Pharoah are on sale by suave vendors who assure you of the genuine nature of their wares, but some travellers are rude enough to declare that the majority of these are made in Birmingham. Boys with donkeys solicit your patronage for a ride to the Pyramids a few miles to the southward, and beggars stretch out grimy hands for 'baksheesh'. The business men of Cairo have been catering to the tourist trade ever since the time of Joseph; we in North America have nothing to teach them, and much to learn from them.

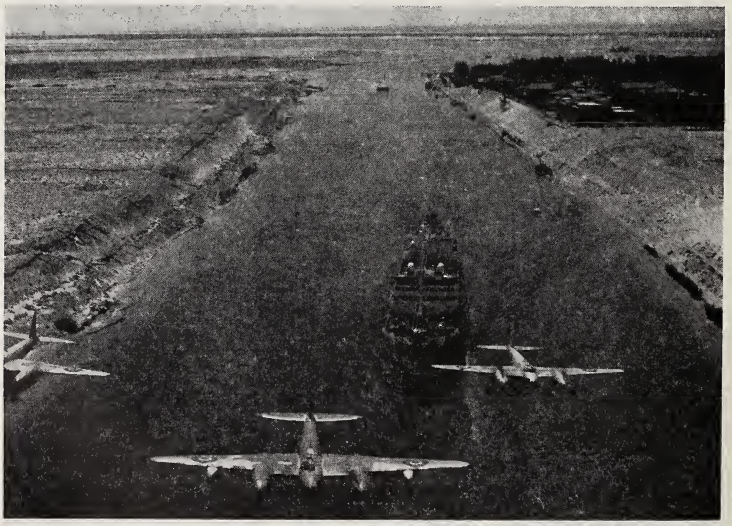
The pyramids rise up from the sandy plain, huge masses of almost solid stone. The largest one covers thirteen acres; each of its sides is over seven hundred feet in length and it is four hundred and eighty feet high. It is a majestic pile of stone and tells of the greatness of Egypt under Cheops, three thousand seven hundred years before Christ. But it also speaks of the vanity of a ruler who would waste the lives of thousands of slaves that a noble edifice might hold his sarcophagus. The Aswan dam is a far better landmark to leave to future generations who read of the British occupation of Egypt from 1882 to 1922.

Egypt is more prosperous today than ever it was in the past. Its population is larger and the dread of famine has been removed as far as the ingenuity of man can arrange.

The Suez Canal Zone

The Suez Canal owes its construction to that eminent French engineer, Ferdinand de Lesseps. He had been resident in Egypt from 1836 and had studied the possibilities of a canal through the desert between the Red Sea and the Mediterranean. In 1854 he submitted plans, and work was commenced five years later. The Egyptian Government of Said Pasha provided 25,000 workmen, and the canal was opened in 1869. In 1875 the British Government bought 176,662 shares from the Khedive of Egypt for the sum of £3,976,528. Today Britain holds 292,222 shares of a total issue of 652,932 shares. A French company, the Compagnie Universelle du Canal Maritime de Suez, with thirty-two directors, eighteen French, ten British, two Egyptian, one American, and one Dutch, manages the canal in the interests of the shareholders.

In 1949 an agreement was reached by which five more Egyptian representatives are to replace the next five French and British vacancies. By the same agreement the whole canal property is to revert to Egypt in 1968.



Courtesy United Kingdom Information Office

Aircraft of the R.A.F. fly low over the Suez Canal.

The canal is 101 miles long and from 236 to 360 feet wide. It has a depth varying from 33 to 40 feet. Passage can be made by day or by night, searchlights are fixed on the vessel's bow, while gas-buoys light the fairway of the canal itself. In comparison with the enormous cost of the Panama Canal the £19,000,000 spent on digging the Suez waterway seems almost ridiculously small.

The Suez Canal, however, is more like a large ditch than a canal in the usual sense of that term. There are no locks. There is no ridge to climb as at Panama, and no escarpment to descend, as at Welland. The presence of small lakes was a great help, and the Suez ditch is in reality dug from lake to lake. The Red Sea is nature's ditch to the Indian Ocean. The Suez and the Red Sea together form the connecting link in the trade route from the Atlantic to the East.

The distance from England to India via Suez is 7,500 miles. It is 11,600 miles via the Cape of Good Hope route. The saving in miles is sufficient proof of the importance of the canal in Commonwealth trade. During a recent year 5,972 vessels, with a net tonnage of 36,576,581 tons, passed through, and of these vessels nearly 50% were British.

Much of the country through which the canal passes is an absolute desert. The great ships tower above the sandy plains and pass silently through a land which nature has seemingly abandoned to heat-waves and eternal drought. Sometimes a few Arabs or a string of camels may be seen from the ship. More often the mirage deceives the passenger with glimpses of lakes, islands, and oases which mysteriously come and go. Over there a suction dredge is moored against the sandy bank, which it must ever repair. Winds are continually drifting fine sand into the canal, and it would soon silt up were it not for the busy dredge.

The maximum speed allowed to vessels through the narrower parts is six miles an hour. This regulation is necessary in order to prevent the wash from the vessels dislodging sand, causing it to fall into the canal.

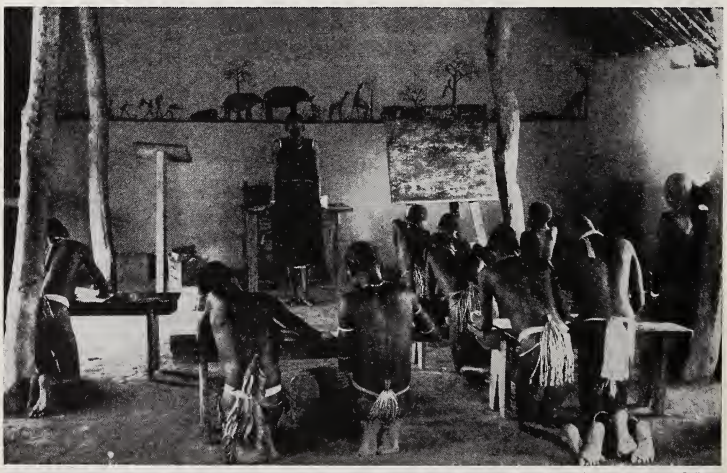
Port Said is at the Mediterranean end and stands on what was once a narrow sandbank separating Lake Menzara from the sea. A long mole extends one and a half miles out to sea in order to protect the canal from the drifting silt from the Nile delta. Port Said grows rapidly in area as well as in population, as the silt drifts against the mole. At the base of the mole a lighthouse, 185 feet high, gives warning to vessels approaching the flat and difficult entrance.

Avenues of trees have been planted and every endeavour has been made to make Port Said a clean and healthy place in which to live and carry on the business of this large port. The massive offices of the Suez Canal Company dominate the city, while the waterfront is lined with coaling docks, repair shops, and a large floating dry dock.

The Anglo-Egyptian Sudan

This large district occupies the central basin of the Nile from Halfa to Uganda, a distance of 1,650 miles. It is a land of wonderful possibilities and has been developing under British rule since 1899. There is rail connection across the Nubian desert to Khartoum, while a branch line runs to the Red Sea, an outlet for the products of the territory.

As we approach Berber, the desert gradually gives place to the grasslands of the Sudan region. The inhabitants are tall, straight negroes, and quite different from the Egyptians of the lower Nile. This separation of races is due to the desert and to the impassable cataracts of the Nile. The population of the Anglo-Egyptian Sudan is estimated at 6,500,000, the majority of whom live between Berber and Fashoda, in the fertile plains of Kordofan and on the plains south and east of Khartoum.



Courtesy United Kingdom Information Office

The Anglo-Egyptian Sudan.

Government-subsidized mission schools bring education to the children of the Sudan. This is a girls' school at the village of Yei.

The principal source of the world's supply of gum arabic is secured from the acacia trees which grow in these semi-arid plains. The sticky sap hardens upon exposure to the air and after several weeks of curing in the bright sunlight, is ready for shipment.

Cotton is grown and is of fine quality, the best Egyptian staple being produced. The area under cotton is gradually increasing under the direction and influence of British companies who wish to arrange for a supply of Empire-grown material. Irrigation dams and canals have been built on the Blue Nile and 850,000 acres are under cultivation on the fertile plain which lies between the Blue and the White Nile and one-quarter is under cotton.

Cotton culture is also spreading southwards among the natives who live in the better-watered district of the Bahr el Ghazal. The progress which has been made is not spectacular, but steady, and is largely one of education among the native tribes. Some observers believe that the Sudan will eventually rival Egypt in the production of long-staple, high-grade cotton.

The date palm flourishes along the course of the Nile between Berber and Halfa and provides the chief food of the people. The grasslands are grazed by camels, goats, sheep, and cattle. The Sudan supplies Egypt with meat and exports hides and skins. The cattle and sheep industry is capable of a large expansion. Millet or dura is the chief food of the plains dwellers; in other countries it is more often used as food for cattle and poultry. Maize will probably grow in favour as the natives learn to use it, and large areas of all Sudan should be suitable for the production of this valuable cereal.

Southern Sudan merges gradually into the rain-forest tropical lands of Uganda. From the Sobat to Gondokoro the country is so flat that the Nile and the Bahr el Ghazal spread over many square miles, with intricate channels leading through vast papyrus swamps. Masses of plant growth, called sudd, choke the waterways, and large parts of the lowlands are uninhabited. The loss of water through evaporation must be very great and it has been proposed to dredge and maintain regular channels through this steaming equatorial bog. This would benefit Egypt by increasing the flow of water during the spring months of low Nile and it would release large areas of fertile soil upon which rice, sugar-cane, and cotton would be grown. South of the Bahr el Ghazal, to the Congo divide, the jungle land is the haunt of the wild African elephant and ivory is the only important export.

Khartoum, at the junction of the White and Blue Niles, is the capital and trading centre of the Sudan. In its warehouses and sheds are collected the gum arabic, the cotton, and the ivory which go down by rail to Berber and to the Red Sea at Suakin and Port Sudan. Other warehouses carry supplies of cotton cloth, iron tools and implements, and the inevitable tin cans of kerosene and gasoline which follow the white man in his penetration and conquest of the far places of the earth.



Courtesy United Kingdom Information Office

THE ANGLO-EGYPTIAN SUDAN.
The Main Square at Omdurman. The trams connect Omdurman, the largest city in the Sudan, with Khartoum, the capital.

Omdurman, the old Dervish capital, lies across the river from Khartoum. It is a sun-baked, straggling native town with narrow streets and squalid quarters. The houses are of sun-dried brick, with thick walls, flat roofs, and a doorway. Wood is scarce, but mud is plentiful, and the negro, as well as the Egyptian, has utilized the most convenient material for the construction of his dwelling.

ETHIOPIA (ABYSSINIA)

The inhabitants of north-eastern Africa are largely negro in origin. About one-third of the people are true Ethiopians, belonging to the Amhara and Shoa tribes. These dwell on the plateau and show an admixture of Arab blood. The Gallas tribes, a negro race, entered Ethiopia from the south several hundred years ago. They are a strong, war-like people.

Ethiopia lies near the Equator, and the climate depends more upon altitude than upon latitude. Two well-defined seasons occur, the wet and the dry. As the sun crosses the Equator in March the rainy season begins. From June to the middle of September heavy rains occur. From October to March there is a long, hot dry season. The high plateau receives fifty to seventy inches of rain, the lower plains sloping to the sea, as little as ten to twenty inches.

In the Dega (9,000 to 15,000 feet) night frosts are common, the vegetation is scanty, and cattle and sheep are pastured throughout the year.

The Voina Dega (5,000 to 9,000 feet) comprises the larger part of the plateau. The mean annual temperature is about 65° F., similar to that of southern Europe. Large areas are covered by a red clay, hard and cracked during the dry season, but a slippery, sticky paste during the wet season. Agriculture is primitive, and there is, as yet, little surplus beyond local food requirements. Millet, barley, flax, and wheat are raised. Vegetables and fruits are also grown. Cotton, similar to the Egyptian variety, is grown in the Hawash valley and around Lake Abaya. Coffee is the chief export. It is thought that the original home of the coffee plant was in the district of Kaffa, where the wild shrub may still be found. Harrar is the centre of coffee production on a large scale, and the berry from this district is of excellent quality. Throughout the Voina Dega are thousands of cattle, sheep, and goats. There are also bands of wiry ponies and donkeys. Everybody who can rides, whether to a wedding, to market, or to war. Manufactures do not exist. The life is pastoral, and largely self-contained. 'Injera', a coarse, pancake like, brown bread made from millet, vegetables, milk, cheese, and meat form a hearty diet for a strong, active mountain people. Hides and skins are exported. Cotton goods and iron tools are the chief imports.

The descent to the 2,000-foot level is direct and steep. In this part the heat is intense and deserts, such as the Danakil, are found. The river valleys leading down to the coast are moist and unhealthy.

It is reported that oil may be found in the Danakil. Coal and iron may be secured from the Lake Tana region. Three per cent of the world's platinum comes from Ethiopia, and this resource will be thoroughly developed. Mica, potash, and gold have also been found.

A railway was completed in 1917 by a French company, from Djibuti, the capital of French Somaliland, to Addis-Ababa, the capital of Ethiopia, 488 miles distant. A good military motor road

was built by the Italian army from Massawa, Eritrea, to the capital during the occupation, but has since deteriorated somewhat.

As a study of the population figures would indicate, much of Eritrea and the French and British Somalilands is either desert or poor grassland. The best land and the best climate are found in Ethiopia, on the Voina Dega.

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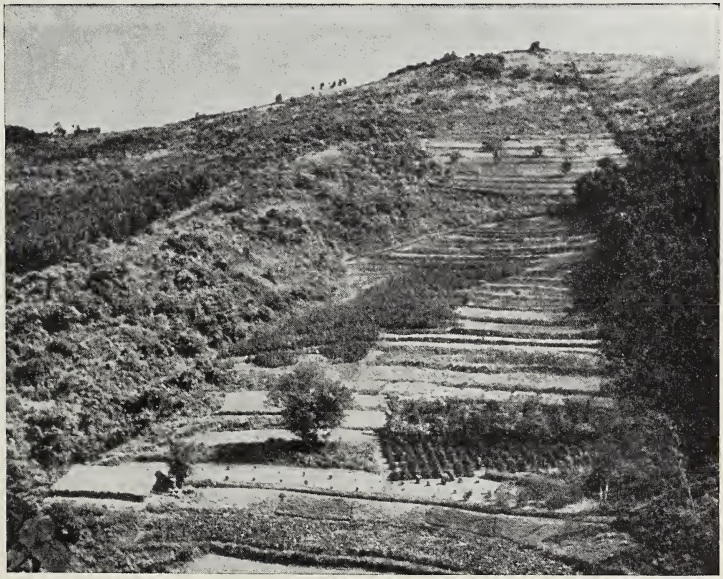
EAST AFRICA

Uganda, Kenya, Tanganyika, Zanzibar, Madagascar

Uganda

Uganda Protectorate is a colony in the making. It came under British rule in 1894 and is presided over by a governor, a legislative council, and an executive council. Tribal chiefs are recognized and have control of local affairs.

In comparison with other African subdivisions, Uganda is small in area. The population of almost 5,000,000 includes 3,600



Courtesy United Kingdom Information Office

A perfect example of strip contouring as practised by the Bakiga tribe in south-west Uganda.

Europeans and 37,500 Asians. Uganda occupies the plateau surrounding the headwaters of the Nile, and has an average elevation of 4,000 feet. In the northern section bordering on the Sudan and Ethiopia there are grasslands and some thorn scrub; but the central section is a fertile savanna country with patches of equatorial forest along the river courses. The rainfall around Lake Victoria is between forty and sixty inches per annum, while the elevation ensures a mean annual temperature of 71° F.

Millet and vegetables are grown by the natives of the northern district, and those around the lake rely principally upon banana groves for their food supply. Cotton is the chief product where production has been encouraged among the natives by the government. White planters are urged to specialize in coffee production so that they are not in competition with the native growers. Some rubber is gathered from both wild and planted areas in the wet lands near Lake Victoria. In the eastern section cattle, sheep and goats are grazed on the dry grasslands. Cotton, coffee, cotton seed, sugar, gold, tin, timber, hides and skins make up the exports in order of their importance.

At Jinja a site has been selected for the Lake Victoria hydro-electric scheme (Owen Falls). When completed, this development will provide power for Uganda's fast growing industries and the introduction of an iron and steel industry is being considered.

Entebbe, the capital and chief commercial centre, is located on Lake Victoria. Small steamers give good service to other lake ports and a main railway runs from Kampala, near the north shore of Lake Victoria, to Mombasa on the coast of Kenya.

Kenya Colony and Protectorate

The Kenya Colony includes that portion of the eastern highlands south of the Sudan and Abyssinia. It is bounded on the East by the Indian Ocean and Somalia, on the south by Tanganyika and on the west by Uganda. It occupies a position in Africa similar to that of Ecuador in South America. The climate varies greatly according to the three main physical divisions; the coast and the immediate hinterland; the low plain to the north and east of the highlands; and the highlands. The total population is 5,373,073 of which figure 154,846 are Europeans and other non-natives.

The coastal section below the Tana River receives the greatest amount of rain; the dry grasslands which are a feature of the Somali coast give away to trees, and, as we approach Mombasa,

the verdure is tropical. Twenty miles inland the plain rises steeply to an escarpment three thousand and more feet in height, part of the upthrust edge of the continent which will be met throughout the whole of southern Africa.

Agriculture is an important industry and a wide range of crops is cultivated. At the lower altitudes cotton and oilseeds are the most important products; in areas above 5,000 ft. coffee, tea, maize, and wheat are the principal crops. Beans, potatoes, millet, coconuts, sugar cane, vegetables, fruit and oil plants are grown in various parts of the colony.

The local market is well supplied with the main food staples and considerable quantities of meat, butter, hides and skins, wool and bacon are produced annually.



Courtesy United Kingdom Information Office

Delamere Avenue in Nairobi, the capital of Kenya.

Nairobi is the capital and administrative centre for Kenya colony and is situated on the high plateau. Fertile grasslands stretch away to the north and south of the plain. In the hollows and river-courses patches and strips of tropical forests are seen. This is the home of the Masai tribes, men who, from time immemorial, have tended their flocks and herds of cattle and fought their inter-tribal wars. They are tall, straight, and self-reliant, a sturdy, independent people. Their dome-like houses are built of sticks, plastered with mud and thatched with grass. They are often built in a circle. The intervening spaces are filled with thorn bushes, and form a kraal or compound so that the

cattle may be driven in at nightfall; for this is the home of the lion and he enjoys a good fat bullock.

The grassy plains of Kenya are frequented by the last great herds of wild grazing animals. The buffalo are gone from the grasslands of North America, but here in central Africa are immense and uncounted herds of antelope, wildebeest, and zebras. Bands of giraffes lumber awkwardly away at the approach of danger and an occasional surly rhinoceros crops the herbage in a stolid manner. Elephants are found in the forest patches and jungle grass, filing leisurely down to some reed-grown pool for a drink and a bath. It is the big-game country of Africa. Sportsmen and travellers tell us that these herds travel northwards with the rains and southwards again in a regular migration, feeding on the quick-growing and tender herbage. The Masai could keep many more head of cattle and sheep if the big game were exterminated. Some day this may be done, but let us hope that it will not occur until these lands are needed to provide meat and hides for the rest of the world. At present the cost of transport to Mombasa is so great that meat products cannot compete with Australian and South American range lands at, or near, tide-water.

The elevation of the plateau provides a moderate and equable climate, with a range in average temperature from 59° F. to 69° F. European settlers have taken up large ranches in the Nairobi district and it is probable that in the future we shall see a large white, land-owning population. Some sisal is grown, as it is a plant which will stand long, dry spells. Coffee is grown on fertile soils around Nairobi and at the base of Mount Kenya. It thrives best where irrigation can supplement the rains. Maize is grown by both native and European and is a staple food of the people. Coffee is the principal export followed by hides and skins, sisal fibre, maize, wool and sugar. Over 7,000,000 acres are now under cultivation in this area and the value of agricultural exports is nearly four times what it was in 1934.

West of the high plateau the land drops suddenly to the rift valley, two to three thousand feet below the general level. Sheep are grazed in the valley floor and this will probably develop into an important industry.

Over forty minerals have been located in Kenya and these resources, not fully exploited at the present time, should prove to be of great importance and value to the future development of the territory. These minerals include gold, silver, copper, iron, graphite, tin, and small amounts of radio-active minerals.

Tanganyika

Tanganyika, a portion of the former colony of German East Africa, is held by Great Britain under a mandate. The coastline has a length of about 500 miles and the north-west corner of the territory touches Lake Victoria. From there the boundary line runs southwards to Lake Tanganyika. From the southern end of the lake the line is drawn across country to Lake Nyasa and thence eastwards over the divide and down river to the ocean—a good instance of the use of natural features for boundaries.

Conditions similar to those in Kenya prevail throughout Tanganyika. A tropical coastal strip is flanked by a dry plain which in turn rises to a more fertile plateau. The products are similar and in order of importance are: sisal fibre, cotton, coffee, hides and skins, and copra. An important discovery of diamonds was made in Tanganyika in recent years, and gems to the value of several hundred thousand pounds sterling were exported in 1950.

Dar-es-Salaam is the chief port and capital city. From here a railway runs inland to Lake Tanganyika. Steamers connect with the Belgian system of communication on the Congo.

Zanzibar and Pemba

Zanzibar, (British Protectorate), the clove island, is situated in latitude 6° S. and 22 miles from the mainland. It is of coral formation, 53 miles long, 24 miles across, and 640 square miles in area. Pemba, a few miles to the north, is of similar formation and about half the area. Arab merchants are in control of the clove industry which is the most noted of its kind in the world. Who would expect to find a 'spice island' nestling at the side of the great bulk of Africa? But rainfall, temperature, and soil are just right and the clove tree flourishes. In the two islands there are 60,000 acres under cloves and over 4,750,000 productive trees. Coco-nut palms are said to cover an even larger area and thousands of tons of copra are gathered each year. The population is largely composed of negroes who work well under the direction of the efficient Arab.

Madagascar

Madagascar is a French colony, separated from the African mainland by Mozambique Channel. The island has a population of about 4 million almost all of whom are native.

A plateau occupies the central part, sloping down steeply to the east and gently to the west. The plateau soils are infertile, but the east slope is well forested.

Climatic conditions vary greatly. The east coast receives rain throughout the year from the south-east Trades; the plateau is hot and damp in summer but cold and dry in winter; the west coast has no winter rain.

Cattle-breeding and the raising of rice, sugar, coffee, cacao and manioc are the leading industries. Graphite, vanilla beans and manioc are the chief exports. Tananarivo, in the centre of the island, is the capital and largest city.

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NORTH-WEST AND NORTH AFRICA

Morocco, Algeria, Tunisia, Libya, The Sahara

The Atlas Mountain Region

North-west Africa is divided politically into Morocco, Algeria, and Tunis. Regionally it is a unit and will be treated from this standpoint. The Barbary States, as they are sometimes called, are now under the control of France. They comprise a large area extending from the Mediterranean, over the Atlas Range and across the Sahara.

A small strip bordering the Strait of Gibraltar, known as the Rif, belongs to Spain. Tangier City and the adjacent district have been internationalized. The whole area might well be under the domination of Spain, but the failure of Spanish rule is shown in the small portion which remains, and in the bitterness of the struggles which the tribesmen have made in order to maintain their freedom.

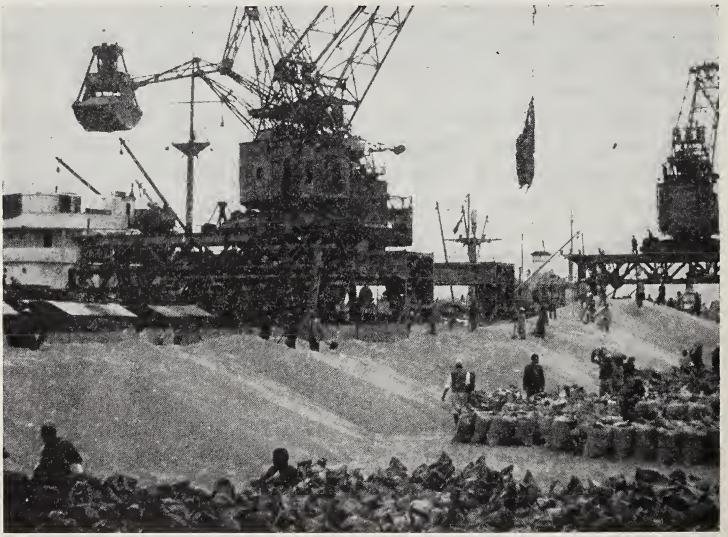
The climate of the northern slope of the Atlas Range is of the Mediterranean type, winter rains and summer heat and drought. The products are those of southern Spain and in contour the two lands are similar.

The Atlas Mountains consist of two great folds or ranges which extend from the Atlantic to the Gulf of Sidra. Between the parallel ranges lies the plateau of the Shotts. The northern Atlas slopes downwards to the coastal plain of the Tell. The Strait of Gibraltar is a submerged portion of the Atlas system which reappears in southern Spain. Some of the peaks of the high Atlas reach an altitude of 11,000 feet. Fold mountains of this type are rare in Africa and are found again only in the vicinity of Cape Town at the extreme southern tip of the continent. The Appalachian and Rocky Mountains of North America are fold mountains and the Atlas Ranges resemble them in many respects.

The western portion of the Atlas system is known as Morocco. The coastal plain is the most productive part of the country and contains the larger part of the population. It has a fertile black

soil and a rainfall of about twenty inches. Large areas are devoted to wheat, maize, barley, and millet, crops which can be grown where the larger part of the precipitation comes during the winter months. Some of the plain is under irrigation, which is necessary for the cultivation of tree fruits and vegetables. French engineers are extending the irrigation systems, and the value of the exports from Morocco has been increasing since the French took charge in 1912. Oranges, grapes, figs, almonds, and olives are the principal fruits of this section.

Casablanca is the chief port and has rail connection with Oran and Algiers to the east and with Marrakesh to the south. Fez is an old and important trading centre. Rabat and Agadir are small Atlantic coast ports which serve their respective districts.



Courtesy Government of France

Unloading wheat at the port of Casablanca.

Behind the coastal strip, the land rises to an elevated tableland, some 1,500 feet above sea-level. The rainfall amounts to only twelve inches or less, and grazing is the chief industry. Cattle, sheep, and goats are raised. As in all grazing regions, there are no large cities, and the population is much less than on the fertile coastal plain.

The Mediterranean coastal section, or Tell, is similar to that of the Atlantic. The rainfall in the lee of the northward curve of

the Atlas is barely twenty inches, but increases towards the east where it amounts to forty inches. Wheat, barley, and maize are the chief cereal crops on those parts of the plain which are above the irrigation level. Wherever possible water from mountain streams has been utilized for irrigation and the gardens produce large quantities of fresh vegetables which are sent to France. The Tell is better known, however, as a land of the vine and fig tree; of olive trees which march in their thousands bravely up the foothills to the base of the Atlas, and of the sweet-scented almond of the lower slopes.

The Tell rises gradually to the frontal or Mediterranean Atlas. This range in turn slopes southwards to a plateau, some hundred miles in width and bordered by the Saharan Atlas, an inland parallel range. Rainfall on the plateau varies from ten to twenty inches and comes during the winter months. The result is a poor steppe land suitable only for grazing. Small streams flowing down from the bordering mountains lose themselves in the plain, where brackish lakes appear in the spring, only to dry up during the hot summer. These are known as shotts and have given their name to the plain. Irrigation is possible on a very small scale.

The plateau of the shotts is occupied by nomad herdsmen who move their flocks from place to place as the herbage is eaten down.

The ranges of the Atlas are forested with cork oak, pine, and cedar. The oak is valuable, and provides employment for those who live in the higher valleys.

Mining is important, the value of the annual output comparing favourably with that of British Columbia. Phosphates, iron, zinc, lead, and salt are secured in considerable quantities.

The plains south of the Atlas Mountains merge gradually into the desert. This is a grazing region in the winter and spring, but is deserted during the summer and fall when the herdsmen have driven their flocks and herds into the high mountain valleys and plateau lands of the inter-montane country.

Oases are found along the base of the Saharan Atlas and French engineers have sunk a number of artesian wells, greatly enlarging the area under irrigation. Date palms are the main source of wealth of those who inhabit the oases.

Libya

Libya occupies the coast of northern Africa between Tunis and Egypt. There is a low coastal plain which rises to a rocky tableland, a remnant of the Atlas system. South of the tableland there

are a few oases and the Sahara desert. The rainfall of this section decreases towards the east. The more fertile portion of Tripoli is found between the Gulf of Gabes and Gulf of Sidra. Oranges and olives are grown and the tall date palm flourishes where oases show the presence of underground water and artesian wells. On the plateau there are fields of wheat and barley and pasturage for flocks of sheep. Libya was annexed by Italy after war with Turkey in 1911 and was granted independence at the beginning of 1952.

The Sahara

The Sahara is that vast and boundless area which stretches from the Nile to the Atlantic and from the Atlas Mountains to the borders of the Sudan. It is often described as a low plateau and as a waste of shifting sand. This is true in a broad sense, but we should note the high mountain mass of the central Sahara. These mountains are composed of hard red rocks and rise five to seven thousand feet in height. Although far inland, their height is sufficient to cool the winds and there are frequent rains. Small streams run down the valleys and lose themselves in the desert. Here and there small patches of ground are under irrigation.

Underground water is the secret of the Sahara. Wells dating back to Roman times are still in use and many more have been bored during the last fifty years. A few wells make an oasis. The water is led away in small ditches and pipes. Date palms are planted and a permanent settlement of people is assured as long as the water continues to flow. The native Bedouin builds his mud-walled house in the shade of the palm trees and grows a small patch of garden truck. Each oasis has a population equal to its productive capacity. In fact, the tendency is for the oasis to become overcrowded.

Some of the oases are very large. That of Tafilet, at the base of the Atlas, is forty miles long and ten miles wide and contains 400 square miles of date-palm forest. Since land is so precious, there are no streets as we know them, but only the narrowest of lanes winding in a labyrinth of curves through the dim masses of the date groves. Three hundred miles south of Tafilet is the large oasis of Tuat, the home of 50,000 people.

The size of the oasis depends upon the amount of underground water which can be brought to the surface. The water percolates slowly through the strata, and some of it must come as far away as the Nile, the Atlas Mountains, the Sudan, and the Niger. If

too many wells are bored, the supply of water grows less after a time and some wells may have to be abandoned. Boring of new wells may enlarge an oasis for a time, but there is always danger that the existing wells will give a decreased flow. The condition of many wells in the great valley of California is a case in point. There is a nice balance in nature which it does not pay to disturb.

The popular idea that the Sahara is a waste of sand is wrong. On the northern and southern borders of the Sahara there is a gradual transition from grasslands through poor steppeland to areas of wind-blown sand and bare rock. Only parts here and there are completely bare. For the most part a tough desert grass and thorny scrub are found. Camels, goats, and sheep browse on these and eke out a scanty living. This must be supplemented by frequent visits to a well or oasis for water. They are also fed dried dates, vegetables, and grass when these can be spared. In this way the Sahara is peopled by those who live in oases, by herdsmen who roam with their flocks in search of pasturage, and by caravans which transport goods from place to place. Dates, hides, and skins are staple products of the desert. Whatever the tribesmen desire in the way of salt, knives, needles, cooking utensils, and guns must be purchased from trading caravans, giving in exchange articles of desert produce. Unless Nature changes her ways and provides more water, the desert of the Sahara will remain as it has remained for the past thousand years. It has probably reached the limit of productiveness under present conditions.

In one respect, however, a remarkable change has been made. Across the desert from oasis to oasis roads have been built. Although caravans of camels still supply the most common means of moving goods, regular bus lines are maintained on the better roads and trucks loaded with freight are common. On the most travelled routes busses are air-conditioned. Air routes also cross the desert in many directions.

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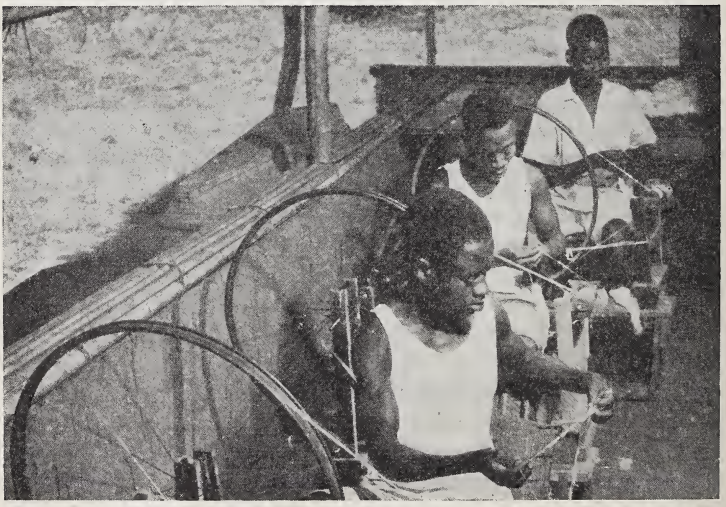
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WEST AFRICA

The Niger valley and the Guinea coast.—Part of this region is under the control of France and part is under British rule.

From the Senegal to the Congo the physical features are somewhat the same: a low coastal plain flanked by an escarpment. The escarpment rises abruptly to a height of several thousand feet, while beyond are plains sloping gradually to the interior of the continent. The coastal section of Senegal has a rainfall of twenty-five inches from November to May. The hot, dry season causes grasslands on the higher ground, but the river courses are heavily timbered. Peanuts, or ground nuts, are the principal source of revenue from this section. Palm oil and palm kernels are also exported and cotton is grown on the higher land. Dakar is the



Courtesy United Kingdom Information Office

NIGERIA.

Village industries are growing in Nigeria. Here are spinners in one of the new weaving centres

chief town. As it is on a point of land stretching out into the Atlantic and so the point in Africa nearest to South America, it has an important airport. Gambia has a rainfall of forty-five inches, November to May, and better grasslands. Ground nuts are the principal export. At Sierra Leone the rainfall increases to 175 inches and we are definitely within the belt of equatorial rains and tropical vegetation. The west coastal strip bordering the Gulf of Guinea includes the districts of Liberia, Ivory Coast, Ashanti, Dahomey, Nigeria, and French Equatorial Africa. Since temperature and rainfall are fairly constant throughout this part, the same equatorial rain forest is everywhere present.

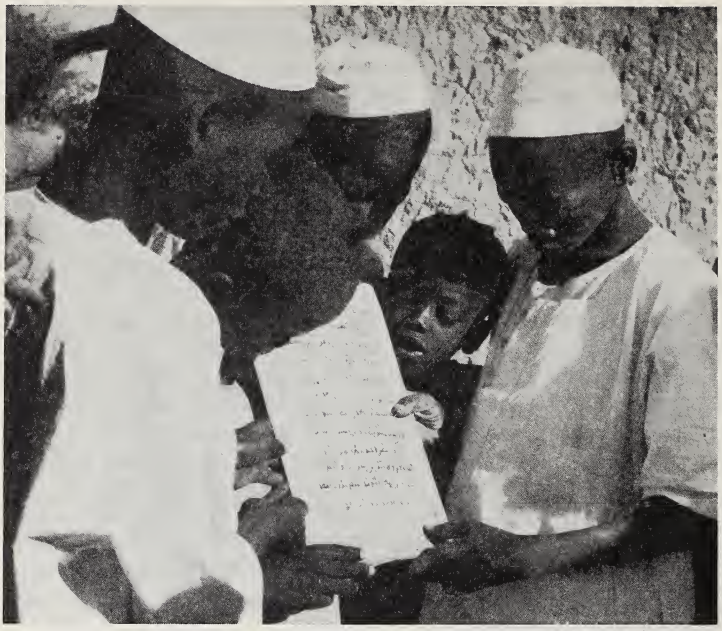
The oil palm is the main source of wealth to the negro of the Gulf of Guinea as is the date palm to the Berber of the Sahara. Each season the oil palm puts forth a cluster of fruit resembling red plums and weighing thirty to forty pounds to the cluster. The cluster is cut off and lowered to the ground where the women of the village pick off the small fruits and throw them into the boiling water. When well cooked they are pounded into a pulp. The oil or fat comes to the surface and is skimmed off, placed in jars, re-heated, and strained. This is the palm-oil of commerce, and thousands of tons of it are exported to Marseilles, Hull, Antwerp, and Liverpool, where factories use it in making soap, candles, and lubricants.

The hard kernel of each fruit is saved, and negro women patiently crack these open to get the small nut inside. These will keep and are exported to European cities, where factories extract the oil. This is of finer quality and is used in salad oils and dressings.

This one tree explains, to a certain degree, the partition of the Guinea coast among the great powers. Trade in palm oil is rapidly developing and it is believed that there are yet large areas which may be made to yield this valuable product.

Cacao plantations are also growing in importance, and over half of the world's supply now comes from West Africa. Comparison as to temperature and rainfall may be made with Ecuador, Colombia, Venezuela, and Trinidad in South America. Growth of the cacao industry in West Africa may be still further explained when we note the large negro population of the Guinea coast and the ability of the negro to work under tropical conditions. In this respect the negro is superior to the coast Indian and mestizo of South America.

There is a variation in rainfall between the coast section and the interior slope where the savanna type of vegetation is found.



Courtesy Keystone View Co.

THE CAMEROONS.
Children at a native school learn to read excerpts from the Koran inscribed on a tablet.

There is an equally well-marked difference in the products. Parts of the highland of Nigeria are 4,000 feet in altitude, and grazing of cattle, sheep, and goats is a wide-spread industry. A little cotton is grown in lowlands near the rivers. The rainfall in the Lake Chad region amounts to only twenty inches, but this is sufficient for crops of millet, wheat, maize, and rice in the low-lying areas. A few places in this region support a dense population. Brazzaville is the only town of any size. Cost of transportation to the coast has so far prevented an extension of the cotton-growing industry Ground nuts, hides, skins, and gum arabic are the principal exports.

The Niger River is the main highway of traffic through French West Africa. The river flows out into the desert and then bends around in a great sweep to the south to find a way through the edge of the plateau and down to the sea. Its course is broken by rapids, and during the season of low water, large stretches of the upper Niger are useless for river craft of any size. Below the Benue junction the Niger is a wide, majestic stream flowing for

a hundred miles through a low coastal plain and often flooding the land for many miles on either side of its banks. Eighty miles from the sea it divides into a number of channels, and these sluggish arms meander to tide-water in a most confusing manner. The flood-plain of the Niger has been built up by river silt and is covered by a mass of rank vegetation. The Government manages to keep one channel reasonably clear of silt and vegetable growths, but the delta is no more useful for trade and commerce than is the delta of the Nile. Harbour works have been constructed at Lagos and a railway runs inland to the middle Niger, and is continued to the northern border of Nigeria. A branch line runs down the left bank of the river to the Benue tributary. In this way the railway avoids the wet, half-flooded delta and provides a short haul to tide-water for the products of the central Niger basin. A motor road connects Gas, on the Niger, with cities on the coast of Morocco. Ibadan, Lagos and Kano are cities with a population of over 100,000 each.

The Congo Basin

The Congo Basin and Belgian Congo are almost identical units. Portions of the Congo basin are as sparsely populated as are similar areas of the Amazon. This situation has been brought about by ravages of the tsetse-fly and of sleeping-sickness. Hundreds of once populous villages have been abandoned and obliterated by the jungle. The Congo provides the scientific world with a major problem.

The basin of the Congo is a huge saucer-shaped depression in central Africa. The lower parts are about a thousand feet above sea-level, but the elevation increases towards the southern rim where heights of four to five thousand feet are found. The Luabala, or upper Congo, is navigable from Bukama to Stanley Falls. At Stanley Falls the Congo tumbles over a ridge of hard rock and enters the lower part of its basin. Here the river flows slowly in a great arc around the bottom of the saucer to Stanley Pool. This 1,100 miles of riverway is dotted with low, alluvial islands, which cause a maze of twisting channels. The central Congo sometimes attains a width of twenty miles. Navigation is difficult and the swampy nature of the land retards native settlement along the banks of the river.

At Stanley Pool the river enters a defile or break in the saucer rim, and for 240 miles it is a whirling, dashing, foaming giant writhing between high rock walls. The river carries little silt and

differs markedly in this respect from the Niger and the Nile. The Congo is second in size to the Amazon, although some claim that at certain seasons of the year the Rio de la Plata discharges as much fresh water into the ocean as does the Congo.

An equatorial rain-belt forest covers the lower and middle Congo. It is hard to clear the land, and the native villages are oases of light and air surrounded by the tall, dark forest. Constant rains leach the soil, and garden patches are abandoned in favour of a new clearing every few years. Then the hungry forest reclaims its own and within a period of five years will obliterate all signs of man's handiwork. Each village requires more land than the area under immediate use. Well-beaten paths lead through the jungle or forest from village to village. The tropical forest belt of the central Congo is a region of manual labour. Loads are carried on head or shoulder, clearing is done by hand, cultivation of the soil and harvesting is a matter of hand labour. Beasts of burden, carts, or machinery of any kind are seldom used. It is a land of constant human toil and with few modern advantages to lighten that toil.

During recent years much has been done to modernize the agricultural methods used in the Belgian Congo. Now one million acres are under cotton cultivation; palm oil production averages 110,000 tons per year; and rubber and coffee are also produced. Transportation facilities are constantly being improved. With 3,500 miles of railroad and 45,000 miles of highway, a good start has been made on providing transportation for this rich country.

The Belgian Congo now ranks third among the copper producing countries of the world. The chief mines are in the Katanga district with Elizabethville the chief mining centre. In the 'atomic age' the Belgian Congo's rich uraniam deposits are outstanding. As nearly as we can tell, some ninety percent of the world's uranium is from this country. Also important is the mining of gold, tin, and cobalt.

Ranking with South Africa in the production of diamonds, the Belgian Congo is the world's largest producer of industrial diamonds.

Angola

Angola, a Portuguese colony, lies south and west of the Belgian Congo. South of the Congo mouth the rainfall decreases rapidly in amount. At Loanda it is barely twenty inches, at Benguella it is less than ten inches. This condition applies to the coastal plain,

fifty to a hundred miles wide, and to the seaward face of the escarpment which rises abruptly from the plain. Where small streams come down from the escarpment and cross the plain, it is possible, by means of irrigation, to grow sugar-cane, and there are a number of such plantations. There is fishing along the coast in the cold waters which flow north from Antarctica, and a fair quantity of dried fish is exported to European markets. In the northern section bordering the lower Congo, coffee is the principal export. Ivory and palm-oil are other exports.

The interior plateau of Angola forms the watershed of several tributaries flowing into the Congo. Other streams flow eastwards into the Zambezi. Southward-flowing streams find their way to the salt pans of Ngami. Parts of the plateau are suitable for grazing and the growing of cereals. There is already a considerable export of maize. It is thought that much more of central Angola will be found to be habitable and that large ranches will be established. Development waits upon the means of transportation.

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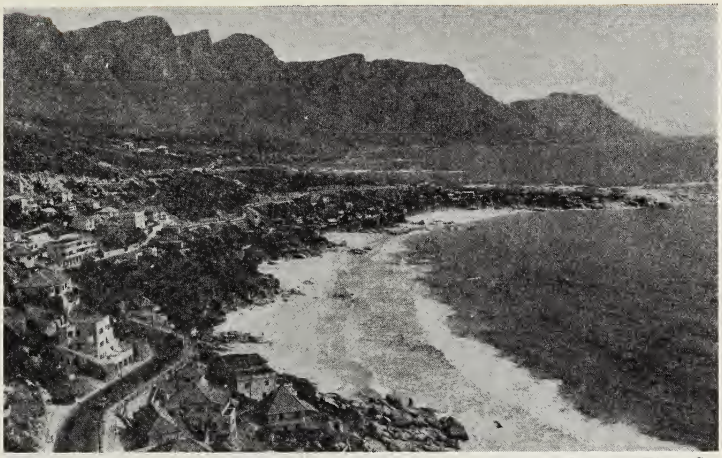
SOUTH AFRICA

The Union of South Africa, Basutoland, Bechuanaland, Swaziland, Rhodesia, Nyasaland, South-west Africa, Mozambique

That portion of the continent which lies south of the Congo watershed is marked off by the twelfth and thirty-fifth parallels of south latitude. The following political divisions are included: the Union of South Africa; the mandated territory of South-West Africa; Basutoland; Bechuanaland Protectorate; Southern Rhodesia; Northern Rhodesia; and Portuguese East Africa.

South Africa is an elevated tableland or plateau which rises abruptly from a narrow coastal plain. The higher part of the escarpment faces the sea, while beyond its bold face the land slopes gradually to the interior. The accumulated waters would thus form an immense lake were it not for the fact that the interior plains are drained by the Zambezi, Limpopo, and Orange Rivers which reach the sea through deeply worn gaps in the escarpment. Lake Ngami lies in a depression of interior drainage and has no outlet. The larger part of the plateau of South Africa is above 4,000 feet in altitude.

The precipitation is heavy on the eastern coastal plain, but decreases rapidly after the edge of the escarpment is passed. In the west it is less than ten inches, and the Kalahari desert parallels the Sahara north of the Equator. The direction of the prevailing winds and the arrangement of the mountain masses account for the amount of rain received throughout the plateau. The southeastern edge of Cape Colony receives rain from the westerlies during the southern winter, May to October. It should also be noted that the east coast is much warmer than the west coast in corresponding latitudes. This is partly explained by the fact that the Mozambique current is a warm current, while the Benguella is a cold current. Comparisons may be made with the coasts of South America in similar latitudes.



Courtesy Keystone View Co.

CAMPS BAY, CAPE TOWN, SOUTH AFRICA.

THE UNION OF SOUTH AFRICA

The Union of South Africa is a member of the British Commonwealth of Nations, and comprises the provinces of Cape of Good Hope, Orange Free State, Natal, and the Transvaal. The area of the Union of South Africa exceeds the combined areas of France, Germany, Switzerland, and Portugal. The difference in population is due, in part, to position and rainfall conditions.

If we were to visit South Africa we would probably book a passage by sea to Cape Town, the principal seaport of the Union. It is a long voyage of 5,978 miles from Southampton, or 6,807 miles from New York. Upon entering Table Bay, the city is seen encircling the base of Table Mountain, which rises behind the city in a precipice 3,582 feet high. Its top cuts the sky-line with a jagged horizontal front two miles in length. To the left is Devil's Peak, to the right are Lion's Head and Signal Hill. Docks and a breakwater, a mile long, have been constructed at great expense in order to handle the export and import trade of the southern part of the continent. Cape Town is a thoroughly modern city with fine buildings, well-paved streets, electric trams, and all that goes to make life pleasant and healthful. The climate is mild and agreeable. It is of Mediterranean type, with winter rains, dry summers, and much sunshine.

The Cape peninsula is a part of the fold-mountain system of South Africa. The ranges extend in parallel ridges and culminate

in the Langeberg and Great Zwarte Bergen. In the lateral valleys of the Cape, small streams drain to the sea, but carry little water during the dry season. Large areas are devoted to growing grapes from which wine, brandy, and vinegar are made. Of late years some attention has been given to growing grapes suitable for drying, and the production of raisins is now of major importance.

In the fertile valleys we see orchards of peaches, pears, plums, apricots, nectarines, and oranges. One is reminded of southern California. The fruit is exported to England, and the Cape supplies a winter market in advance of the Mediterranean product. Canneries at Cape Town, Port Elizabeth, and in the Paarl district take care of excess production.

Many of the orchards are irrigated. The higher land is devoted to wheat, oats, and barley, crops which can be planted in April and May immediately before the winter rains, and harvested in November and December. Forty per cent of the wheat grown in the Union comes from south-western Cape Colony. South Africa, however, is unable to supply its own requirements and imports about five million bushels of wheat annually. Some wheat is grown in north-eastern Orange Free State, but there the variation in the amount of rainfall from year to year makes the crop somewhat of a gamble.

The centre of ostrich-farming is located in Oudtshoorn valley. The mountains are bare and sterile, but the valley is bright with alfalfa fields, vineyards, orange groves, orchards, fields of tobacco, and the plumage of the domesticated ostrich. Irrigation has turned a semi-arid valley into one of nature's garden spots. Ostrich-farming is an industry in which South Africa leads the world. In order to produce the best feathers, the ostrich requires a dry climate and an abundance of nutritious food. The ostriches feed in the irrigated alfalfa fields. There is keen competition for birds of approved lineage and exceptional ostriches have been sold for as much as £1,000 a pair. However, financial success in ostrich-farming depends to a great extent on the trend in fashions.

Port Elizabeth is the natural outlet for the valleys which lie in the V between Graaff Reinet and Queenstown. Irrigation reservoirs have been built and this area has the largest amount of irrigated land in the union. The port is a busy manufacturing centre. There are foundries and factories making candles, soap, jam, biscuits, and confectionery. Tanneries have been established and a number of factories make boots and shoes. Cement is made and there are two large motor-car assembly plants. Wool from the

plains of the karroo is brought down by rail and is washed and cleaned for export.

The karroo lies north of the fertile, irrigated coastal valleys. It has been described as a waterless wilderness having neither beauty nor loving-kindness. And yet a few hundred years ago the karroo was probably a garden of flowers and grass supporting vast herds of game. The present dry river-courses were bright with the sheen of running water throughout the year.

The karroo beds lie between the fold mountains and the edge of the escarpment. The rainfall is less than fifteen inches and varies from year to year. There is an occasional very dry year. As is often the case in places of low rainfall, the soil is fertile. There is an abundance of sunshine and plenty of heat. One thing is lacking—water. Oudtshoorn is situated in the Little Karroo, and conditions in that district show what can be accomplished where irrigation is possible. The Great Karroo is at best a grazing land for flocks of sheep and goats. The vegetation consists of dwarfed shrubs, often thorny. The carrying capacity of the land is five to ten acres for one sheep.

Beaufort West is the only town of importance in this section of the karroo. It lies at the foot of the Nieuwveld Mountains, where a 700,000,000-gallon reservoir has been constructed. The irrigated land, an oasis of green in a desert of brown, produces fruits, hay, and grain. Sheep are grazed and fed on the green pastures. Wool is the chief article of export. The total rainfall at Beaufort West during two years, amounted to 4.76 inches. This is typical of the karroo.

The Orange River and its tributaries drain the larger part of the plateau. The river has worn its way down below the general level and is of little use for irrigation purposes. It heads in the mountains of the eastern escarpment and is in flood during the rainy period, October to March. During the rest of the year it dwindles to a succession of pools throughout its lower course. The river begins its descent from the plateau about three hundred miles from its mouth. Here it drops four hundred feet in a few miles and rapids occur within twenty-five miles of its entrance into the sea. For these reasons neither the river nor its break through the escarpment have been of the slightest commercial use for roadway or railway. Contrasts may be made with the Fraser River of western Canada and the St. Lawrence of eastern Canada. These rivers perform a valuable service in providing outlets by rail and by vessel for products of the interior of the continent. The agri-

cultural development of the upper karroo is no doubt hindered by the lack of low rail gradients to seaboard.

Sheep and goats are the principal source of income on the upper karroo and are, in fact, widely distributed over the whole of South Africa. Almost all the wool is exported overseas and the people buy back the manufactured article. Wool sales are held from time to time in Durban, East London, Port Elizabeth, and Cape Town. Much fine merino wool is produced, and brings a higher price than the common grades.

The mohair from the Angora goat is valuable and is exported. The larger part of the clip is sold to the Bradford mills in Yorkshire where it is spun into yarn and distributed. Turkey is the only competitor of South Africa in the production of mohair, and each country supplies about half of the world's demands.

Wool accounts for over half of the total value of the agricultural exports of South Africa.

Occasional, severe, and widespread droughts can bring near ruin to the sheep industry. Wild animals leave the parched veldt lands and invade the pastures in search of food and water. The sheep mortality is severe, and the flockmasters have a hard time to pull through.

ORANGE FREE STATE

Orange Free State occupies the high veldt of the plateau. The high veldt has an average elevation of five thousand feet and an invigorating climate. The rainfall is from twenty to thirty-five inches. The country, generally, has a rolling surface, which becomes flatter as the land merges with the lower and drier karroo towards the south and west. Occasionally steep-sided, flat-topped hills or 'kopjes' are seen. The veldt may be described as a vast, treeless, rolling prairie, a sea of grass.

Growing of maize is the chief agricultural industry, while herds of cattle and flocks of sheep and goats add to the pastoral wealth of the country-side. There are no large cities. Bloemfontein and Kroonstad, next in size, are the main settlements.

Dairying is increasing in importance and there are now a number of creameries and cheese factories. Local requirements are supplied and there is a small export.

Orange Free State is noted for its production of maize. This crop is now considered the agricultural mainstay of the province. In fact, maize occupies a position in the Union similar to that which wheat holds in Canada and in Australia. Since 1904 pro-

duction of maize has increased from 360,000 tons to 2,500,000 tons. Two well-defined corn belts, one in Orange Free State and the other in the Transvaal, exist where soil, rainfall, and labour supply are exactly right.

Kaffir corn is native to South Africa and is grown throughout the Union. Its drought-resisting qualities make it a valuable crop. It will stand dormant during intervals of dry weather and will resume its growth when the rains recur—surely an accommodating plant. Kaffir corn is used chiefly as a food for poultry and stock.

Native peoples of South Africa consider maize their staple food. Maize is also used extensively as cattle food. What is not used locally is exported. Over thirty grain elevators have been built by the Government in order to handle this crop on up-to-date lines. Port elevators at Durban and Cape Town remind one of similar elevators at Vancouver and Montreal.

Gold mining discoveries during the past few years in the Orange Free State near Bloemfontein may lead to the founding of a mine comparable to the famous Rand mine in Transvaal. The most recent gold strike was at Odendaalstrust in 1946.

Diamonds are found near Jagersfontein and Koffyfontein, coal is mined just south of the Vaal, and iron ores and salt are also found in the State.

NATAL

Natal is the eastern coastal province of the Union. It lies between the Drakensberg Mountains and the sea. Although smaller than Orange Free State in area, it has a population more than twice that of its inland neighbour. The coastal, or palm belt, extends inland ten to twenty miles and has a heavy rainfall. This belt carries the larger part of the population. West of the wet coastal strip the land rises by a series of steps to the Drakensberg Range, which reaches a height of 11,000 feet in Giant's Castle. Maize is grown for local needs, but sugar plantations provide the principal source of wealth. The plantation owners have their own mills. Raw sugar is refined at Durban. The production is sufficient for the requirements of the Union in sugar, molasses, methylated spirits, and rum. A small surplus is exported.

The coastal plain also produces pineapples for export, and dairying is growing in importance.

Behind the palm belt, the land is rugged, the rainfall decreases, and one finds patches of grass and thorny scrub where sheep and goats are pastured.

Durban is the third largest city in the Union. It is a beautiful, modern city, situated on a capacious, landlocked harbour and is a busy port. Durban has rail connection with the interior and so is the gateway for the mineral wealth of the interior. The building of the railway line up to and over the escarpment was a difficult piece of engineering, but it has well repaid the effort in opening up the Newcastle coal deposit. This is the best steam coal in South Africa. Since the second World War, the great coal-fields on the border between Transvaal and Natal have been greatly developed. The deposits are claimed to be some of the world's greatest and fortunately lie close to the surface. Today, the annual output has reached the point that 4,000,000 tons are exported each year.

THE TRANSVAAL

This important province of the Union lies between the Vaal and the Limpopo Rivers. It is bounded on the east by the escarpment of the high veldt. The general contour of southern Transvaal is similar to that of Orange Free State. The high veldt lands extend westwards to Mafeking and northwards to Johannesburg and Lydenburg. Johannesburg has an elevation of 5,732 feet. To north and north-east the high veldt descends to the middle veldt and then in turn to the low veldt and the valley of the Limpopo River. Agriculture on the high veldt is similar to that in Orange Free State. There are cattle ranches and flocks of sheep and goats. The farm-houses are surrounded by gum trees, wattle, and orchards. Windmills may be seen pumping water for the trees, stock, and human inhabitants. Sometimes an irrigation flume brings the water down from a distant rivulet. Everywhere a sea of grass extends to the horizon's edge. In the more fertile sections fields of maize are seen. It is a rich, fair land, stimulating and healthful, because of the altitude.

Johannesburg is the hub of the Transvaal and of all the neighbouring lands both high and low. All roads lead eventually to this city, the largest in South Africa, and the reason is—gold.

Thirty-five percent of the world's gold supply comes from the Johannesburg district.

Gold.—The gold-bearing ores are found in a ridge of conglomerate rocks which is known as the Witwatersrand ('Ridge of White Waters), or, more commonly, the Rand. It is situated on the edge of the high veldt near Johannesburg and forms the divide



Courtesy Keystone View Co.

The 'Devil's Window', near Sabie, in the north-eastern Transvaal.

between the Vaal and the Limpopo. The conglomerate beds of the Rand are composed of quartz pebbles bound together by a siliceous cement and known as 'banket'. The gold in the banket is not often visible to the naked eye and was not discovered until 1885. The next year Johannesburg was founded and in 1887 the first stamp mill was built. Three years later the first cyanide works were opened and the extraction of gold from these low-grade ores became a commercial success.

The beds of conglomerate are known as 'reefs', and strike east and west, with a dip to the south. At first inclined shafts followed the reef from the outcrop, but as the depth increased vertical shafts were found to be necessary. Some of the mines are 9,000 feet deep, and so much banket has been removed that large portions of the abandoned workings have fallen in, causing earth tremors and even endangering the active workings. To prevent this, it is now the custom to fill in each worked-out section with the refuse from the dumps. There has also been an

increased use of timbering. The reefs extend over a length of eleven and a half miles and can be mined to a depth of 9,000 feet.

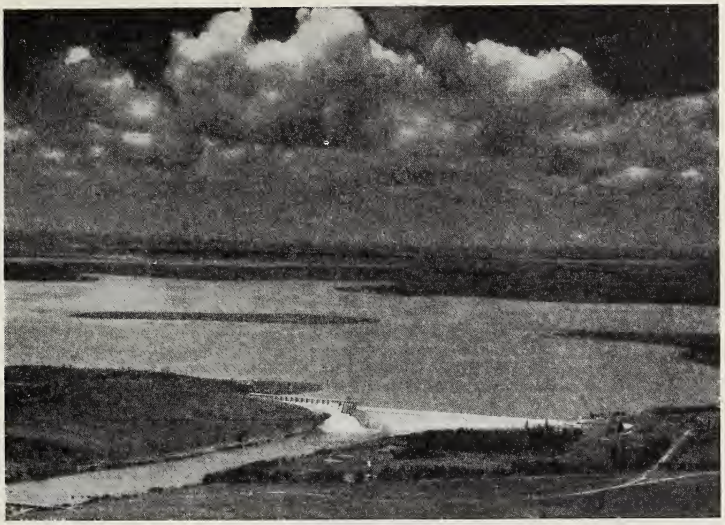
Coal is secured from the Middelburg field, which lies a hundred miles to the north-east of the Rand. The coal is utilized at the mines and in the production of electrical energy for the whole district, including the city of Johannesburg. It is mainly due to the production of cheap coal that the large output of gold has been made possible. On the Witwatersrand proper, only a few mines would be working at the present time if a plentiful supply of steam coal were not available.

An iron and steel plant has been brought into operation to use not only the coal and iron deposits but the manganese and chromite so much desired in making alloys of steel.

Diamonds were first discovered in South Africa more than sixty years ago. The diamonds are found in gravel beds along the Vaal and Orange Rivers from Prieska eastward and northward. The alluvial diamonds bring higher prices and are of very fine quality. Griqualand West, on the lower Vaal, has been the stand-by of the alluvial digger; 90% of the diamonds, however, come from the huge pipes of kimberlite. These are of volcanic origin and occur at widely scattered places, those at Kimberley, Jagersfontein, and Pretoria being the best known. The Premier Mine is the largest pipe which is worked. It lies twenty miles east-north-east of Pretoria, and covers an area of nearly eighty acres. The pipe is a rough oval 2,900 feet long and 1,500 feet across. The diamond-bearing earth has been removed to a depth of 400 feet. The perpendicular sides form a great open hole in the plateau. When day and night shifts are employed, there are about 410 white employees and 3,200 native workmen.

The average daily recovery has been 2,200 carats. The mine is so large that, at the usual rate of working, the depth increases but eight and three quarter feet per annum, and, as the walls are firm and massive, it would seem that the mining may go on for many years. There are three large pipes at Kimberley. Their combined area is a little larger than the famous Premier Mine.

The Union of South Africa charges a 10% export tax on all diamonds leaving the country, and licence fees of five shillings a month on all alluvial claims. The diamond sales are regulated by the London Diamond Syndicate, so that over-production is not allowed to flood the market and lower the price. Sales for a number of years have averaged about 50% of the world supply. The remaining 50% comes from Belgian Congo, Angola, Tanganyika, British Guiana, and Brazil.



Courtesy, B.O.A.C.

THE VAAL DAM.

It will be seen that diamonds and gold form a remarkable and valuable export from South Africa. These two minerals are chiefly responsible for the fine system of railways which has been built through the Orange Free State and the Transvaal. The large cities of the interior, and those who mine for gold, diamonds and coal, provide a market for the farmers who cultivate the land.

BASUTOLAND

Basutoland is a native reserve lying between the Caledon River and the Quathlamba-Drakensberg Range. In form it is an irregular oval carved out of the side of the Orange Free State. It is about the size of Belgium.

The eastern portion of Basutoland is a jumbled mass of mountains with narrow valleys, and there is little ground fit for cultivation. Westwards, towards the Caledon, the ground is hilly and some parts are suitable for maize. There are no railways within the borders of the reserve, though one line touches the southern border.

The territory is governed by a resident commissioner, and the seven local districts are presided over by hereditary chiefs. Maseru is the capital town, with a population of 2,200. The Bantus, who

form almost the entire population, are an agricultural people and own large flocks of sheep and goats. Wool, mohair, hides, and skins are the principal exports.

Bechuanaland

This territory, divided politically into British Bechuanaland and the British Protectorate, governed as a Crown colony, lies north of the Molopo and west of the Limpopo River. Its average altitude is about 3,300 feet. The winter climate, May to August, is delightful. The heat during the other months is great. Malarial fever is prevalent in the neighbourhood of the watercourses, where, during and immediately after the season of heavy rains, December to the end of April, the dense bush, thick undergrowth, and rank vegetation afford excellent breeding grounds for the mosquito. On the eastern side of the protectorate the land is undulating and covered with grass. Towards the west the grasslands merge into the sandy wastes of the Kalahari desert. Old and well defined river-courses indicate, however, that at one time the country was well watered. The population is small.

Irrigation has not been a success. Water secured by boring in the dry western section is brackish. Agriculture is hazardous on account of the uncertain nature of the rainfall; and grazing of cattle, sheep, and goats is as yet the only occupation of the native inhabitants. Locusts are collected, dried, and make excellent cattle feed. The locust plague is common throughout the central plateau of South Africa and it is interesting to learn that at least one use for the insects has been found.

Swaziland

Swaziland, like Basutoland is a native reserve. It is on the eastern side of the Transvaal. There is a resident commissioner and an advisory council. The reserve is bounded on the west by the mountain rim of the high veldt. The lands of the reserve are well watered and many streams run down to the Limpopo, while other streams flow directly into the sea. The population numbers about 113,000, consisting of natives allied to the Zulu race. Stock-raising is the principal industry. The river valleys are not suitable for Europeans as malaria is prevalent.

Rhodesia

The Zambezi River divides Rhodesia into two parts. Southern Rhodesia includes the plateau which drains to the Limpopo and

the Zambezi. The watershed has an altitude of 4,000 feet, but this height is not maintained over the larger part of the district. There is a descent to the 3,000-foot level and then a further drop to the 1,000-foot level of the valley lands. Altitude is a deciding factor in determining the suitability of the country for European settlement. As a rule, the higher the land the more healthful it is.

The climate is temperate over the high part of the plateau. The rains come during the southern summer, November to March, giving forty inches in the eastern part, but decreasing to twenty inches in the west, where Rhodesia joins with Bechuanaland and the Kalahari. Beyond the Rhodesian border lie the Makarikari salt-pans and the interior drainage basin of Lake Ngami.

The Rhodesian plateau is well mineralized, and gold is mined from banket reef formations, as in the Rand. The chief mines are located along the railway between Bulawayo and Salisbury. At Selukwe valuable chrome ores are mined. Deposits of lead, tin, iron, and copper have been located, but the production as yet is small. Coal of good coking quality is mined at Wankie near the main rail line from Bulawayo to Livingstone. A large part of the coal is shipped north by rail to the Katanaga copper-mines in Belgian Congo. The Transvaal and Southern Rhodesia together supply 25% of the world's asbestos. They are Canada's chief competitors in the production of this mineral.

The district around Salisbury is also known as Mashonaland, and produces considerable maize and tobacco. Stock-raising is general throughout Southern Rhodesia. Rail connection with Beira makes it possible to maintain a large export trade in frozen beef. The mining centres to the south also provide a steady market.

Northern Rhodesia includes the land drained by the tributary streams which flow south into the Zambezi. The northern part of Rhodesia extends as far as Lake Tanganyika and the watershed sloping to Lakes Bangweulu and Mweru of the Congo basin. The average altitude of Northern Rhodesia is probably less than 3,000 feet, and the climate is hot. In the western section there are streams which run part of the year. These watercourses are lined with thick jungle, with here and there patches of forest. Away from the streams the uplands are covered with coarse grass and thorny shrubs, the usual savanna type of vegetation. Cattle-ranching is the chief industry. The eastern section of Rhodesia has a heavier rainfall, thirty to forty inches, and maize and cotton are grown in the valley of the Loangwa. Lead, copper, and zinc



Courtesy United Kingdom Information Office

THE NORTHERN RHODESIAN COPPERBELT.
A general view of the Roan Antelope Copper Mine looking across the compound towards the smelting plant.

are mined. It is doubtful if Northern Rhodesia will ever support a large European population. The climate is too hot, and malaria is rampant in the fertile valleys.

The name Rhodesia is a perpetual memorial to Cecil Rhodes, the great Imperialist, who did so much to bring about the Union of South Africa.

NYASALAND PROTECTORATE

This is a narrow strip of territory extending along Lake Nyasa and the Shire River to Port Herald. It almost cuts Portuguese South Africa in two. Nyasaland is low in the south, but rises gradually until the land reaches an altitude of over 6,000 feet in the mountains which border Lake Nyasa on the west.

Every type of climate is found, from the hot, moist lowlands to the temperate climate of the high plateau. Coffee is grown extensively throughout the Shire highlands, and there is a moderate export. Tobacco is the leading export. Cotton-growing is increasing in importance, and some tea is produced.

Blantyre, in the Shire highlands, is the principal town.

SOUTH-WEST AFRICA

South-West Africa was placed under mandate of the Union by the League of Nations, but since the League has ceased to function and the United Nations has taken over most of its work, there is a problem remaining to be settled as to just who should have control of South-West Africa, a territory nearly as large as

British Columbia. Although the Union of South Africa's application for the incorporation of this mandate into the Union was rejected by the United Nations, the territory is in close association with the Union and is represented in the Union's parliament. Stock-raising is the principal industry. Some Karakul sheep are kept and pelts are exported. Diamonds are recovered from gravels along the coast from the Orange River northwards, and are the leading export. Copper, lead, vanadium, and tin are mined on a small scale. Windhoek is the capital.

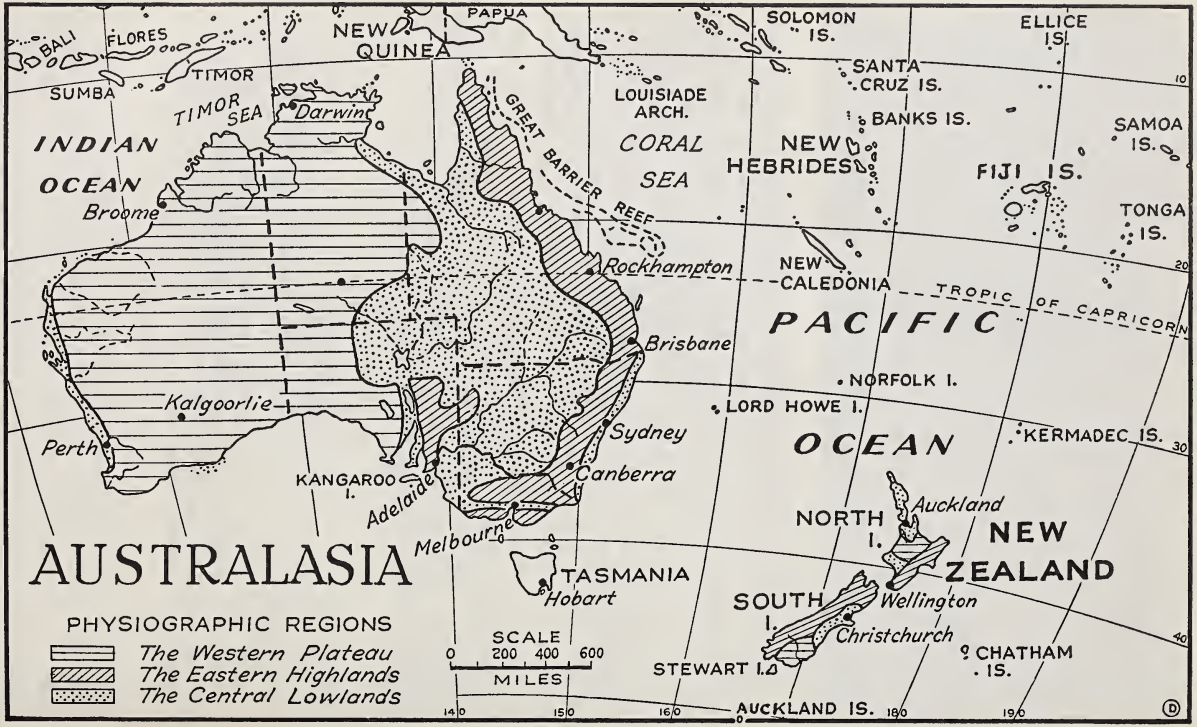
Mozambique

Mozambique (Portuguese East Africa) occupies the coastal strip between Tanganyika Territory and Natal. The population is largely negro.

This territory resembles Natal in configuration. The coastal plain rises gradually to rolling tablelands which finally merge into the escarpment of South Africa. Sugar-cane, cotton, and ivory are the principal exports. Interest in the territory centres chiefly in the two ports of Lourenço Marques and Beira. The Delagoa Bay Railway has direct connection with Pretoria, and is one of the principal routes for exporting products of the Transvaal. Beira is connected by rail with Salisbury, and by the Rhodesian Railway with Bulawayo, Broken Hill, Kambove, and Bukama on the Congo. Both Lourenço Marques and Beira owe their commercial importance to transit trade with the Transvaal and with Rhodesia. Lourenço Marques receives coal from collieries in the Transvaal and vies with Durban, 295 miles south, as one of the principal coaling stations on the coast of East Africa.

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AUSTRALASIA
PHYSIOGRAPHIC REGIONS
The Western Plateau
The Eastern Highlands
The Central Lowlands
SCALE
0 200 400 600
MILES
INDIAN OCEAN
TIMOR SEA
CORAL SEA
PACIFIC OCEAN
BALI
FLORES
SUMBA
TIMOR
NEW QUINEA
PAPUA
SOLOMON IS.
ELLICE IS.
SANTA CRUZ IS.
LOUISIADE ARCH.
BANKS IS.
NEW HEBRIDES
SAMOA IS.
FIJI IS.
TONGA IS.
NEW CALEDONIA
TROPIC OF CAPRICORN
NORFOLK I.
LORD HOWE I.
KERMADEC IS.
GREAT BARRIER REEF
Darwin
Broome
Rockhampton
Brisbane
Kalgoorlie
Perth
Sydney
Canberra
KANGAROO I.
Adelaide
Melbourne
TASMANIA
Hobart
NORTH I.
Auckland
NEW ZEALAND
SOUTH I.
Wellington
Christchurch
STEWART I.
CHATHAM IS.
AUCKLAND IS.
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36

AUSTRALIA

Australia

Australia is sometimes called the land 'down under'. It is the only large land mass lying completely within the southern hemisphere. The Tropic of Capricorn divides Australia into almost equal portions. Its position determines the seasons. When it is winter in Canada it is summer 'down under'. When our wheat is ripening it is time for the Australian farmer to plant his crop.

Australia is often called the island-continent. It is the world's largest island, and it is the smallest of the continents. Its position in the southern hemisphere, almost in the middle of the South Pacific, 2,000 miles from Asia, 7,000 miles from South America, and 4,000 miles from Africa, has determined the development of this vast land. Australia is less than 150 years old if we count from the first European settlement at Sydney in 1788. The population has nearly doubled in the last thirty years, in 1947, it totalled 7,579,358. It may be said that the steamship, the refrigerator ship and the Suez Canal have made Australia a land of promise and of opportunity.

A population map of the continent shows that the distribution of the people is very uneven; that the people have selected the eastern and western sections for their homes. The reason for this will be found in the rainfall and temperature maps of your atlas.

In a broad way we may conclude that the Australian has selected those areas where there is a moderate rainfall and a moderate temperature; that the population decreases towards the north where the tropical heat becomes intense; and that the European immigrant has selected those parts of the continent which resemble the land from which he came.

The physical map of Australia shows that the continent is a low plateau with rim mountains along the eastern coast. Note the direction of the prevailing winds and the effect these have on the seaward slope of the mountains. Much of the interior is dry and desert-like because of these rim mountains which drain back the moisture from the sea breezes. One notable feature is the lack of large river systems. The Murray-Darling is Australia's one large river. The eastern coastal plain is narrow and the rivers which drain the wet section of the continent are short and rapid.

The eastern highlands of Australia present a steep face to the sea, but slope gently towards the interior. The three states of Victoria, New South Wales and Queensland divide the primary highland among them. In the Queensland section, the mountains press down to the sea and there is little coastal plain. In New South Wales the mountains retreat and the coastal plain is much wider. In Victoria the mountain axis swings westward and a number of parallel ranges are found. These culminate in the Australian Alps. The coastal plain is broken by ridges which extend into the sea.

CLIMATE

The climate of Australia has as direct an influence on the distribution of population, as has the surface. Since the Tropic of Capricorn crosses Australia, all of the country north of this line has the direct rays of the sun during the southern summer months of December, January and February. During these months the heat in northern Australia, particularly in the dry interior, is intense. Even during the opposite season of the year the cold is never severe, and the only part of the continent which has snow, except as a rarity, is the highlands in the south-east, known as the Australian Alps. Here skiing and other winter sports are enjoyed during the winter months.

The most remarkable fact about the rainfall of Australia is that the greater part of the continent receives an annual precipitation of less than 20 inches. The northern part of the continent receives monsoon rains varying in amount from 40 to 80 inches. These come during the summer, when the direct rays of the sun are

over the central part of the continent. During the winter months, the winds blow off-shore, so that there is little or no rain. The eastern part of the country, east of the Dividing Range, has rainfall throughout the year, brought by the Trade winds, which give up their moisture as they are forced upwards over the mountain wall.

The two southern corners of the continent receive their rainfall from the Westerly winds, during the southern winter. The amount of rainfall decreases rapidly with the distance from the coast. Tasmania is always under the Westerly Winds, and being an island, receives abundant rainfall throughout the year.

The interior of the continent, shut off by highlands from the moisture-bearing winds, is very dry. Much of it is desert. The northern part of the west coast is also extremely dry, since the Trade winds here blow from the dry heart of the continent.

Thus it can be seen that Australia has several markedly different climatic regions; the northern monsoon, the humid east coast under the Trades, the southern Mediterranean, the central desert, the north-west coast under the offshore Trades, and the oceanic region under the Westerlies, in Tasmania.

Cash cropping, overgrazing and exploitation have taken their toll of a country which is not too well favoured with rainfall except in limited areas. In recent years disastrous floods and equally disastrous summer drought have been costly. Irrigation from artesian wells has aided in developing agriculture in arid areas, but there is a limit to the amount of water available.

The most highly developed region of Australia is that in the east containing the states of Queensland, New South Wales, and Victoria. These will be dealt with under separate headings.

QUEENSLAND

The northern part of the coast of Queensland is covered with forest. South of the heavily forested section, sugar cane is the most important crop. Under the policy of a 'White Australia', we have here one of the few examples of a cane-sugar crop produced by white labour. The increased cost has made it difficult to export sugar in competition with that grown on plantations using cheap coolie labour. The Queensland sugar, however, is sold in the Australian market under a protective tariff. Tropical Queensland also produces bananas, pineapples, oranges, and mangoes. These are sold in the urban centres which have developed along the eastern coast.

Cotton grows well on the fertile soils of the river valleys. The expansion of the cotton industry depends upon a supply of cheap labour and it is unlikely that there will be any increase in the amount grown until the labour question is solved. A few farmers are growing coffee and tobacco, but the total production is of slight importance. Winter wheat and corn are very important crops. A variety of fruits are grown which include citrus fruits, pineapples, bananas, grapes, mangoes, apples, peaches, plums, and other English fruits. Grass and fodder crops grow luxuriantly on higher land and there is no need for expensive winter housing and feeding of cattle as in Canada. Thus the raising of cattle and dairying are growing in importance.

Queensland's 16,000,000 sheep, representing one-sixth of Australia's sheep population, are raised on the drier pastoral areas extending westward from the Great Dividing Range.

The minerals produced in this district, in order of their value, are lead, coal, zinc, gold, tin, silver, and copper. Cairns, Townsville, Rockhampton, and Brisbane have railway lines which either tap mineral areas or pass through the mountains to the plains beyond. These cities are, therefore, export centres for a large hinterland, and owe their size to the large amount of territory which they serve. The broken nature of the Queensland coast has led to the development of a number of ports rather than to the concentration of trade in one large port as in the states to the south.

The Great Barrier Reef runs parallel to the coast from the vicinity of Rockhampton to Cape York. The reef encloses a shallow sea and affords some protection to the coastwise shipping from the storms which sometimes lash these shores. It is formed of coral and consists of many island-like masses which rise just above the level of the sea. Some of the reefs are close to shore, but the inland sea averages fifty miles in width. The coral insect does not like fresh water, and wherever a river flows into the sea there is a break in the Barrier Reef. This adds to the value of a river mouth as a situation for the Queensland ports. Some of the islands which form the Barrier Reef are being used for resort purposes. This industry should expand as the population of the mainland increases.

Townsville (34,109) and **Rockhampton** are the largest of the ports behind the Barrier Reef. The latter is situated forty miles up the Fitzroy River in the heart of a fertile valley. The trade of the Mount Morgan mines, and some trade from the Great Basin, centres

at Rockhampton. **Brisbane** (402,030) is the capital of Queensland, and is situated in the south-eastern end of the state, where the climate is more moderate, and where there is no interference from the reef. The city is located at the head of navigation on Brisbane River. Ipswich, a few miles distant, is a manufacturing centre on the only coal-field in the state. Coal is exported through Brisbane for the use of ships, and for various ports and mines which lie to the northward. Brisbane is a manufacturing and warehouse centre. Large exports of wool, cattle, and frozen meat are made. Supplies are sent westwards by rail to that part of Queensland lying west of the Dividing Range.

NEW SOUTH WALES

The coastal plain, which varies in width from thirty to one hundred miles, is crossed at intervals by short rivers which have fertile lowland areas but do not provide suitable harbours. Dairying is an important industry of the fertile lowlands. Tobacco, grapes, and citrus fruits are grown.

Port Jackson, midway along the New South Wales coast, provides one of the finest harbours in the world. Here the first European immigrants came in 1788, and the surrounding settlements have the advantage of age. For many years any one wishing to emigrate to Australia booked a passage to Port Jackson and the colonists spread out from there. They found a mild climate and a generous rainfall, a place where fruits and grains of southern



Courtesy, B.O.A.C.

SYDNEY HARBOUR.

England could be grown. And on the shore of the spacious harbour the city of **Sydney** developed. Today it is the capital of the state and one-half of the population of New South Wales resides in the city. In 1947, Sydney's population totalled 1,484,000. Its harbour is claimed to be one of the finest in the world with 190 miles of water frontage. The import-export trade far exceeds that of any other Australian seaport. Three passes or 'gates' open through the western mountain barrier, giving access to the plateau and range lands of the interior.

Manufacturing.—Over one-quarter of the population of Sydney is engaged in manufacturing, the source of power being the huge coal-fields which underlie the district like a giant saucer, covering some 16,000 square miles. The most important manufacturing region in the country extends from Newcastle through Sydney to Port Kembla. Large blast furnaces turn out iron and steel, which are then fashioned into many types of articles from ships and locomotives to wire. Rubber tires and other articles made of rubber are manufactured. Other factories process the natural products of the coast and the interior sections of the state.

There is no railway line serving the 300 miles of coast south of Wollongong, owing to the broken nature of the coastal plain. Trade is carried on out of Sydney by means of coasting vessels.

VICTORIA

Victoria occupies the south-eastern end of the continent. Here the Dividing Range swings towards the west and is known as the Australian Alps. A dozen peaks rise above the 5,000-foot contour line and culminate in Mount Koskiusco, 7,000 feet high. The coastal plain below Cape Howe gradually broadens into the great valley of Victoria. The valley is shut off from the sea by the rolling Gippsland and Otway Hills. Between these, a flooded portion provides a large bay known as Port Phillip. At its head stands the city of Melbourne, second in size and importance to Sydney.

The eastern end of the valley is fertile, and given over to dairying. In the hills hardwood eucalyptus trees grow tall and straight, some of them reaching 300 feet. There we find lumbermen at work. West of Port Phillip the valley is drier and wheat is grown; sheep-ranching takes the place of dairying, which is so important in the eastern section. Geelong is an industrial town on the western arm of Port Phillip, and is a natural outlet for wheat and wool. Woollen mills manufacture some of the raw material brought down from the interior ranges.



Courtesy Keystone View Co.

A lumberman climbs a giant in the timber country of Victoria.

Melbourne (1,226,409) dominates Victoria as Sydney does New South Wales. The city has a strategic location at the head of Port Phillip, and controls the trade of the great valley which lies to east and west. Rail lines go northwards through Kilmore gap to the Murray basin and westwards to the gold-fields of Ballarat and Bendigo. It was the discovery of alluvial gold, in 1851, in the hills west of Melbourne that gave the city its start and led to the formation of the state of Victoria. The deposits proved to be fabulously rich; the diggings were easy to work, the gold lying practically on the surface. Some of the larger nuggets weighed as much as 200 lb. Thousands of people rushed to Melbourne and the city grew rapidly as a supply centre for the mines. After the gold was exhausted many miners remained and took up land. And thus the state of Victoria was born, with Melbourne its one great city.

Brisbane, Sydney, and Melbourne dominate their respective districts to a remarkable degree. The concentration of population in these centres is most unusual for a young country and for one whose total population is still less than 8,000,000.

The Dividing Range.—Let us now turn to a survey of the mountain mass which has given form and contour to the eastern part of the continent. The Great Dividing Range is formed from

the uplifted part of an old plain consisting of sandstone rock many hundreds of feet in thickness. Through the sandstone, huge masses of granite have intruded from below, while in other places there are evidences of outpourings of basalt. Since these convulsions of nature took place the rivers have dug deep gorges through the softer sandstone, carving the old plateau into blocks and leaving the harder granite massif towering above the valleys.

The escarpment is high enough to intercept the south-east Trades and cause a heavy rainfall upon the eastern slope. As we pass within the mountain folds the rainfall decreases, and as we pass beyond the ranges to the western plains it is still less, until, at 300 miles from the sea, there is less than ten inches per annum. The forest of the eastern slope gives way to a parkland, and this in turn to grasslands with a few scattered trees of the eucalyptus variety. Throughout the mountain region and on the western slope to the great central basin of Australia, sheep-raising is the leading industry. There are more sheep being grazed in the states of Queensland, New South Wales, and Victoria than in any similar area in the world.

Sheep-ranching.—The mild, dry climate, the immense areas of natural grazing ground, much of it at an elevation of 2,000 feet, have all helped to make Australia the premier land of sheep and wool. It will be noted that one state, New South Wales, contains half the sheep in Australia. This is due to its size and geographical position. A large part of Queensland is too hot and Victoria is small in area.

Australia has less than one-sixth of the world's sheep, but produces one-quarter of the world's supply of wool. This record is even more important when we learn that it represents one-half of the world production of fine quality merino wool. Ninety-four per cent of the Australian wool clip is exported. Wool is the chief factor in the pastoral wealth of Australia, and the nation's prosperity is largely dependent upon the satisfactory sale of its annual wool clip. Export of wool averages 48% of the value of the total shipments of merchandise from Australia.

In a recent year Australia's wool clip gave an average of 9.6 pounds of wool for every sheep. When compared with wool production in the Soviet Republics, the excellence of the Australian product is remarkable, for the sheep in the U.S.S.R. averaged only 3.6 lb. a fleece. For many years the flock-masters of Australia have imported breeding stock of the very best varieties and quality. They are now able to grow and select their own breeding animals.

The ability to raise better sheep depends in some measure upon education and intelligence. Some say that the success of the Australian sheepmen lies in the educational system provided by the people of the state.

In addition to the sale of wool, the flock-masters of Australia must dispose of several million sheep and lambs each year. This is done in order to keep the ranges from being overstocked and to keep the flocks up to a high standard. Add the value of the meat, the values of the wool and of the sheepskins, and you will get some idea of the amount earned by Australians from the sheep industry each year.



Courtesy Keystone View Co.

SHEEP-RANCHING.
A horseman rounds up a flock for sheering.

An Australian sheep ranch.—Let us examine more particularly those factors which help to make Australia the Land of the Golden Fleece. So admirable is the climate of the Australian downs or plains that housing for the sheep is not required. The ranch spreads over 1,000 to 10,000 acres. Much of it is fenced off into paddocks. In this way one man can attend to a large number of sheep, driving the flocks from paddock to paddock as the condition of the grass demands it. At seasons of lamb-marking, shearing, cattle-mustering and branding, more labour is required, as in harvesting operations on our Canadian wheat fields.

The Australian has learned to run a moderate number of sheep on a large acreage, putting from thirty to fifty in a hundred-acre field. Rainfall on the downs varies from year to year and no one can foretell the amount. When rains are plentiful the pastures can carry more animals, but the owner prefers to keep his flock in good condition and conserve the pastures for dry seasons which are sure to come. It is always a temptation to increase the flocks after a season of good rain.

The better ranches are enclosed with wire-netted fencing. These keep the rabbits in check. Where there is no fencing, poisoned bait is used. Yet even this pest of wild rabbits is utilized and a substantial revenue is derived from them. Millions of rabbits are trapped each year. They are skinned, frozen, and exported to Great Britain. Export of rabbit fur is a thriving business. Much of our felt comes from this source of supply. Rabbit skins dyed to resemble muskrat or seal are in demand by United States and Canadian furriers for the manufacture of fur coats.

The sheep country is crossed by few lines of railway. The wool clip is transported long distances by trucks. Some of the sheep ranches are two hundred miles from the nearest station. Transport of the wool and supplies for the ranch go on throughout the year over dusty trackways, only occasionally soaked by rain. It would be very expensive to link up all the scattered ranches by rail. The dry and level nature of the country helps the Australian rancher to get his produce to market in a very inexpensive manner. Similar conditions are found in southern Argentina.

The Murray River.—The one and only large river system of the country drains southwards through this section of the land. The Murray has its source in the Australian Alps, and flows for 450 miles along the border of New South Wales and Victoria. Its source is in the highest part of the continent, and no matter what the amount of precipitation may be in the dry interior, there is always water for the Murray from melting snows. Shallow-draught river steamers, drawing barges piled high with wool or grain, descend the Murray to Murray Bridge and Coolwa, where railways carry the produce to Adelaide for export. Water transport is slow but cheap and there is little danger that the cargo will spoil on its way to market.

The plains enclosed by the Murray and Murrumbidgee are known as the Riverina. This district is well watered and the soil is fertile. The Riverina produces some of the best merino wool in the world.

The Darling River, 1,760 miles in length, drains an even larger area than the Murray. Its fan-shaped source waters comprise a number of tributaries which together drain 700 miles of the Great Dividing Range. The most noted of these river-bound lands is known as the Darling Downs. In its lower reaches the Darling flows for 350 miles without receiving an important tributary. The Darling Downs receive little rain. Therefore, when the rains of southern Queensland partially fail, as they sometimes do, the Darling becomes merely a series of muddy pools. However, in ordinary years, the Darling and its tributaries provide a water-borne outlet for the sheep ranches of the great basin.

It is unfortunate that the lower course of the Murray is so crooked and erratic. A wide, deep estuary, similar to that of La Plata, would greatly facilitate the easy export of the wool, grain, sheep, and cattle from the great basin. The mouths of the river are blocked by sand bars and goods are trans-shipped to railways which run to Adelaide and Melbourne. No large city has developed at the mouth of the Murray, and yet the river is a busy highway.

Some of the river steamers are fitted as floating shops and stop here and there along the river bank. The settler's wife is then able to do her shopping from her own landing stage, hundreds of miles from the nearest store.

The artesian basin.—Pasturing of sheep or cattle on land which receives a bare ten inches of rain has been a problem in every part of the world where this condition prevails. The small streams are dry throughout the greater part of the year and the flocks must have water. In this respect nature has been kind to the great basin of Australia. It has been found that large areas of the plains region are underlain by a sheet of rocks composed of marine clays and known as the rolling downs formation. Beneath these are porous sandstones.[1] When bores are put down through the clay into the sandstone water rushes up the bore under high pressure, having been held under by the impermeable clay. It is thought that this water comes from rain which falls on the Queensland mountains and that it gradually soaks through the sandstone, which is exposed. The underground water follows the dip of the strata towards the south and west.

The water of the artesian bores is often hot when it comes to the surface and is sometimes impregnated with mineral salts, which renders it unfit for irrigation crops, but fortunately it does not

[1]See page 39.

injure the sheep. Where the water proves to be unfit for human use, deep pans or sinks are dug and the rain-water is collected in these miniature lakes. Trees are planted along the edge for shade to prevent evaporation, and by such means the rancher and his flocks are assured a supply of water during the long dry season.

It is possible that more artesian basins will be found and that new grazing areas will be established. Of course there is a limit to the number of bores which can be put down in any given area. If too many wells are bored the water table is lowered and some wells may go dry. Other wells which once spouted water ten feet into the air may have to be pumped. At present the wells in the great basin and in the Murray basin equal the supply of underground water. This is one more control which nature exercises over man's activities. The extension of the sheep industry is being limited by the supply of underground water.

The Queensland section of the artesian basin has the largest number of bores. Artesian wells of New South Wales make it possible to pasture sheep on 4,000,000 acres, which would otherwise be of little use. The city of Fremantle is largely dependent upon artesian water, and Perth uses wells to augment the natural run-off from the surrounding hills.

Irrigation projects.—The people of Central Australia have also embarked upon large and ambitious irrigation schemes. In Queensland, the Dawson valley undertaking involved construction of the Nathan dam, which serves 200,000 acres.

In New South Wales the Murrumbidgee irrigation area lies on the north side of the river, where a weir diverts water from the stream into the main canal. A storage dam, 240 miles upstream, retains excess water during the rainy season and releases it for use downstream during the dry season. As is so often the case in dry regions, the soil is wonderfully fertile but needs water to produce valuable crops. Rice-growing is a major industry in this area and sufficient is produced to supply the requirements of the Australian people. About 8,000 acres are planted with orchard, growing apricots, peaches, nectarines, prunes, pears, plums, and almonds; 5,300 acres are devoted to citrus fruits, and a similar amount is in vineyards, producing wine, table-grapes, raisins, and sultanas.

The Curlwaa area, at the junction of the Darling and Murray Rivers, is under intensive cultivation, the necssary irrigation water being pumped from the river. Some of the finest oranges in New South Wales are grown here. Several other important irrigation projects are under development or already completed in the basins of the Murray, Murrumbidgee and Goulburn Rivers.

The valley lands of the Murrumbidgee and Murray Rivers have rapidly changed their appearance during the last twenty years. Australia is supplying her own people with home-grown fruits, many of them of the Mediterranean type, and there is a large surplus for export. In fact, the Australian Government is trying to open up world markets for the increasing supply. Raisins from Australia are being sold in Canada; jams and preserved fruits are exported to the United Kingdom. If the Murray River basin were as close to a population of 130,000,000 people as is the great valley of California, we would long ago have heard of its productivity. As it is, the enterprise of the Australians in developing their lands so far from world markets is truly remarkable.

Wheat.—Wheat is the most extensively grown cereal in Australia. The area sown to grain and hay amounts to 70% of the total acreage under cultivation. Canada, the United States, Argentina, India, and Russia have more acres in wheat, but Australia, with its small population, is able to export a large proportion of the total crop.

Dry farming methods are in use, and summer fallowing, careful seed selection, and the use of chemical fertilizers help to maintain an average yield of twelve bushels an acre. This is more noteworthy in view of the fact that the wheat areas are located between rainfall limits of twelve and twenty inches. Domestic consumption for flour and seed purposes amounts to about 40,000,000 bushels, which leaves the balance of the crop for export.

The wheat lands of Australia lie in a belt near the coast and stretch inland in some places for 300 miles. Wheat-growing is limited by the rainfall, which decreases as distance from the coast increases. In their natural state the wheat lands are lightly timbered with gum trees, eucalyptus, and pine. Some large sections are covered with a low-growing scrub termed mallee. This is a species of eucalyptus standing ten to twelve feet high. Scattered through it are taller-growing trees, which provide shade and beauty after the mallee scrub has been destroyed. The conquest of the mallee country stands as one of the finest achievements of Australian agriculture. Presence of the scrub indicates two things: a low rainfall and rich soil. It was conquered by means of the mallee roller, which, drawn by bullocks, smashes down the scrub level with the ground. The limbs are then piled and burned. Stump-jump ploughs, which enable the disc to ride over sunken roots, are used for the first cultivation.

The wheat farmer in Australia usually keeps flocks of sheep as

well; these help to maintain the fertility of the soil, they keep the fallow clean, and are sometimes used to keep the growth of the crop in check.

The story of Australia's rise in wheat-growing is incomplete without a reference to William Farrer, who gave many years of study to the growing and developing of a wheat which would mature under a hot sun with less than six inches of rain during the growing season. His 'Federation' variety is now as well known in Australia as 'Marquis' is in Canada. It has increased the annual yield by two bushels an acre; it makes excellent flour and is drought-resistant. The stalk is short and bears a small flag in order to lessen the drain upon the moisture in the soil.

Tractors are now used on Australian wheat fields, replacing bullocks for rough ploughing and horses for the combines. Australia was slower to develop mechanized farming than Canada in view of the absence of a local gasoline supply, together with a high import tariff on motors.

The problem of transporting wheat to the seaboard has been solved with an eye to the cheapest means of conveyance and of storage. The dry climate, as in Argentina, makes it possible to store wheat under a light framework roofed with galvanized iron sheets. There are few country elevators of the Canadian type. A number of seaports, Brisbane, Sydney, Melbourne, Adelaide, and Perth, the big five of the Australian Commonwealth, are within a 300-mile rail haul of the wheat lands. Storage warehouses receive the wheat at the docks and hold it for loading on the vessels. Terminal elevators are now being built to meet demands for cleaner wheat and even grades, and in order to eliminate the rush for export. An unfortunate disadvantage is found in the different railway gauges in use throughout Australia. Between Brisbane and Perth the gauge, or distance between the rails, is in one area the standard width of 4 feet 8½ inches, in another 5 feet 3 inches, and in still another 3 feet 6 inches. As all passengers and freight must be moved from one car to another at each change of gauge the cost of transcontinental shipments is greatly increased. To solve this great handicap, Australia has embarked on a gigantic rebuilding of her railways to standard gauge. In Canada a comparable programme would amount to rebuilding a railway system the size of the C.P.R.

Cattle-ranching and dairying.—We have examined three of the great agricultural industries of the lands which lie west of the Dividing Range. Cattle-ranching remains for brief discussion. In

Queensland, beef cattle predominate as they do in Northern Territory and in Western Australia. The coast districts of southern Queensland, New South Wales, Victoria, and Tasmania specialize in dairy cattle.

Cattle-ranching in Australia is a far different proposition from what it is in Canada. Winter feeding and housing are almost unknown. The one thing the Australian farmer dreads is a prolonged drought. This is being alleviated to a large degree by artesian bores, and is being further eliminated by the growing of hay and fodder crops on irrigated lands below the power and irrigation dams.

Of the beef produced in Australia, about 77 per cent is consumed locally, and the remainder is exported. This means that the average Australian eats about 150 pounds of beef a year, as compared to 59 pounds for the average Canadian and 66 pounds for the average American. When we remember that the Australian climate is many degrees warmer than that of Canada, and that a part of Australia is tropical, we must seek an explanation. One probable reason is found in the far greater consumption of fish by people of the two countries named above. Except in the coastal cities, the people of Australia seldom see fresh fish. We should also note the abounding energy with which Australians have developed their land, the stimulation of bright sunshine, a dry atmosphere, and hard work on farm, orchard, vineyard, and in mine. Lastly, beef in Australia is a comparatively cheap food.

The export trade in frozen beef is largely with the United Kingdom, Belgium, and Germany.

While we are noting what the Australians eat it might be well to include the mutton and lamb which are produced each year. Again the local trade is found to consume 72%, which means 76 pounds a head of the population. Comparative figures for Canada are 6 pounds, and the United States 6½ pounds. It is evident that the Australian believes in patronizing home industry to the fullest possible extent.

Dairying in Australia is carried on under much the same favourable climatic conditions that pertain to the growing of beef cattle. Shelter is not required; native and imported grasses furnish succulent food during the greater part of the year, and winter fodder, when necessary, is fed the cattle in the fields. The dairying industry has shown rapid expansion during recent years. Government supervision and inspection of butter and cheese ensures purity and quality in the product. Cream separation and butter-making are

now carried on under the co-operative system. The creation of large central butter factories, supplied by numerous separating establishments or creameries, has resulted in a considerable reduction in cost of manufacture, and the butter and cheese are of a more uniform quality. Dairying is carried on chiefly east of the Dividing Range and near the large cities.

SOUTH AUSTRALIA

West of the Murray, the Mount Lofty and Flinders Ranges extend northwards beyond the head of Spencer Gulf. Although these hills are only 2,000 feet high, they interrupt the winds and receive a moderate rainfall. In the small valleys fruit, vegetables, potatoes, hay, and grain are grown. Some lumber is obtained from the forests, chiefly from the red gum and stringy-bark trees.

The greater part of the population of South Australia is found on the Adelaide plains which lie between Mount Lofty and St. Vincent Gulf. These plains and Yorke peninsula provide rich soil suitable for growing wheat. Some wheat is grown on the Eyre peninsula, but the rainfall diminishes rapidly as one proceeds inland, and the Nullarbor plain is covered with saltbush. North of this plain are vast sandy areas at present wholly unsettled.

Lake Eyre and its adjacent Lakes Torrens, Frome, and Gairdner form an area of inland drainage. Lake Eyre is 200 feet below sea-level. The rivers and creeks which drain into these lakes are merely dry watercourses during the greater part of the year. The five or six inches of rainfall come, as a rule, in sudden storms. There is a quick run-off. The dry creek beds become raging torrents for a few days.[1] Soon, however, the flood is past and there is nothing to be seen but a few waterholes, a shallow lagoon, or acres of sun-baked mud. The lakes themselves vary greatly in area. For the most part they are flat stretches of mud covered with shining salt crystals.

Wheat is the chief source of wealth in South Australia. There is a short haul to the seaboard, and the wheat is exported quickly and cheaply through Adelaide, Port Augusta, and other ports. This is a distinct advantage over the wheat lands of the Murray-Darling basin.

Sheep are raised throughout the wheat district, but their range extends far beyond the eight-inch rainfall line, into the saltbush plains of the interior. Wool is exported from the same ports as

[1]This creates a great danger to sheep or cattle pastured near stream beds and at times thousands of animals perish.

the wheat, but the value of the wool crop is barely half that of the wheat.

Cattle are grazed in the same area as that allotted to wheat, and form a third source of pastoral wealth. The number of cattle is not large, but they are mostly of dairy breeds.

Mining.—The mineral wealth of South Australia is important. Iron ore is mined at Iron Knob, thirty miles inland from Spencer Gulf; copper is mined on Yorke peninsula. Silver-lead-zinc ores from the famous Broken Hill mines of New South Wales are sent by rail to the great smelting works at Port Pirie. The ore trains carry back coal, mine-timber, textiles, groceries, and other goods required by the miners. Broken Hill is tributary to South Australia and the people of that state receive the major part of the benefit from the rich veins of ore which happen to lie within the borders of New South Wales.

Salt is another important mineral of South Australia. It is scraped from exposed dry beds of salt lakes in the southern part of Yorke peninsula, and at other points. These lakes are subject to inundation during the winter but dry up during the long, hot, dry summer. The flooding waters add their quota of dissolved earth salts, and each year the lake beds are rejuvenated. It will be noted that the saltworks are near tide-water, which provides the cheapest possible freight rates. South Australia leads in the production of salt.

The opal is mined from Stuart's Range in the far north-western part of the state. This is one of the world's chief opal fields.

Adelaide (382,454) is the capital and business centre of South Australia, and one of the 'big five' of Australia's cities. It is located a few miles inland on the banks of the small Torrens River. Railway lines radiate to every part of the rich plain which borders St. Vincent and Spencer gulfs. The main east line crosses the Mount Lofty Range and taps the irrigated lands of the lower Murray basin. This line continues to Melbourne, where connection is made with lines to Sydney and Brisbane. To the west a railway line via Port Augusta links Adelaide with the great transcontinental railway which runs to Perth. A branch line extends north from Port Augusta to Lake Eyre basin, and on to Alice Springs. It is planned to complete this line through to Darwin. The city of Adelaide has been beautified with great care. The principal streets are wide boulevards, and a belt of parkland of 1,900 acres surrounds the city proper. Yet Adelaide is a manufacturing centre of importance. Thousands of the inhabitants find employment in

factories making leather, weaving cloth, making clothing, furniture, soap, harness, saddles, or in printing and binding books. Many are employed in railway shops. Port Adelaide has a steam-power house at tide-water where coal from Newcastle is landed at the wharf. An electric freezing plant is located on the harbour and there are storage tanks for fuel oil and gasoline.

Port Adelaide is the chief import centre for South Australia. The main steamship lines call at the port and discharge bananas and pineapples from Queensland, coal from Newcastle, jarrah timber from Western Australia, and Australian oak from Tasmania. From overseas come machinery, paper, musical instruments, motor-cars, textiles, petroleum, tea, coffee, cocoa, rubber, and spices. Adelaide is the chief distributing centre for South Australia.

WESTERN AUSTRALIA

So vast are these lands under the Southern Cross that it takes three days to go by rail from Adelaide to Perth, a little over halfway across the continent. Western Australia is the largest in area among the states of the Commonwealth, but the smallest in population. It has even less rain than South Australia. The people live on a strip along the coast from Geraldton to Albany.

The Darling Range behind Perth acts in the same way as the Mount Lofty Range behind Adelaide. On the windward side, facing the sea, there is a moderate rainfall. Wheat is grown on the well-watered plain adjacent to Perth and in the valleys of the Darling Range. The amount of wheat exceeds that of South Australia. Sheep are grazed throughout the wheat area and are distributed in lessening numbers northwards as far as Fortescue River north of the Tropic of Capricorn. Cattle are more widely distributed and are found in greatest number north of the tropic and in the Fitzroy River basin.

The pastoral industry of wheat, sheep, and cattle is, as in the other states of the Commonwealth, the main and widespread industry. In addition to the pastoral pursuits, lumbering is carried on in a belt of timber which extends through the south-western corner of the state. Busselton is a busy milling centre for jarrah and other hardwoods. Where the land has been cleared of its forest growth, fruit and vegetable gardens are seen.

Perth (272,528) is situated on Swan River, one of the few perennial streams of Western Australia. Its port, Freemantle, has been constructed at great expense, large breakwaters being necessary.

Natural ports along this coast are few and far between. Western Australia does little manufacturing. Perth is far from a coal-field, and, apart from a few tanneries, saw-mills, soap and candle factories, a Government meat-freezing establishment, and a few boot and shoe factories, the requirements of the people are imported. The exports are almost wholly primary products: wool, wheat, hides, skins, frozen meat, and timber.

Mining is of considerable importance. Geraldton is an export centre for the gold-lead-copper mines of the Mount Margaret district, to which a railway has been built. Discovery of rich gold ores was made at Kalgoorlie in 1892. Within ten years the annual output of gold reached the remarkable sum of $40,000,000. Mining has gone on steadily in the Kalgoorlie field, but the output has fallen to a fraction of its former greatness. It is still, however, the leading gold-mining district of Australia.

The development of the Kalgoorlie field is a tale of fortitude and of daring. The mines are located on scrubland, 400 miles east of Perth. Water was a problem. It was secured by the construction of a pipeline across the plains to the Darling Range, a distance of 350 miles. A railway was built and a water supply arranged for it as well. The mines have proved a market for products of the fertile Perth district. The development of Perth and of Fremantle has kept pace with the development of the Kalgoorlie gold-field. Melbourne began in a similar manner and Adelaide benefits from trade with the Broken Hill mines.

The larger part of Western Australia is a dreary waste of sand and rock. Not even in the Sahara is there a more complete lack of water. The Murchison, Gascoyne, Ashburton Fortescue, and Fitzroy Rivers all go dry during the rainless period. Beyond their headwaters the great Australian desert stretches away to Lake Eyre basin, a waterless plateau, 1,000 feet above sea-level, and intersected by long ridges of sand and stones, with here and there a clump of prickly spinifex.

TASMANIA

Tasmania, the smallest of the Australian states, is separated from the mainland by the shallow Bass Strait. This island is a partially submerged outlier of the Dividing Range and occupies a position similar in many respects to that of Sicily or Ceylon.

The heart of the island consists of a tableland 2,000 feet high with a few peaks rising to 5,000 feet. The south-western portion is so rugged that it has never been thoroughly explored. The north-

ern part of Tasmania shows evidences of intrusive volcanic rocks which have weathered, forming rich soils. A railway runs from Launceston to Hobart and to settlements in the Derwent and Huon valleys. The centre of the island is occupied by several lakes.

The mountain masses are mineralized, and tin, copper, zinc, tungsten, and silver-lead occur. Tasmania has a large zinc smelter which uses not only the ores from the island, but also concentrates brought in from Broken Hill.

Owing to its insular position and its latitude, Tasmania possesses a mild and agreeable climate. It does not have the summer heat of the continent, and the winter season is usually pleasant. The rainfall averages over sixty inches annually on the west coast but decreases in the lee of the mountain ranges to thirty inches on the east coast. Snow remains on the higher elevations for several months of the winter season. As a result of heavy precipitation, the rivers are strong-flowing streams, their descent is rapid, and falls and cataracts are numerous. Hydro-electric plants have been installed, and since Tasmania has no coal, this form of power has been largely developed.

Sheep are pastured on the hills of the central plateau and in the south-eastern section of the island. Lumbering is important in the valley of the upper Huon and in mountain valleys of the north-west section. Fruit-growing, principally of apples, is a leading industry of Deloraine, west of Launceston, and in the valleys of the Derwent and Huon Rivers. The chief exports are wool, minerals, fruit, and timber. The imports are largely manufactured articles from Melbourne and Sydney.

Hobart (76,534), the capital, is beautifully situated on Derwent estuary at the foot of Mount Wellington. It is the chief port during the fruit season when vessels call for shipments destined for the European market. Launceston and Burnie trade by vessel direct with Melbourne.

THE TERRITORIES

The Capital Territory.—The Commonwealth of Australia is a federation of six states and two territories, the Northern Territory and the Capital Territory. The several members of the Commonwealth found it impossible to agree on one of the coastal cities as a capital and at length selected an area of 940 square miles in New South Wales to be known as the Federal Capital Territory. The Great War, 1914-18, delayed construction of the capital buildings and it was not until 1927 that the Senate

and House of Representatives, then sitting at Melbourne, resolved to move into their new quarters at Canberra.

The Capital Territory is under direct control of the Federal Government through three commissioners. The arrangement is similar to that made for Washington, the capital of the United States. Canberra lies at an elevation of 2,000 feet on a plain east of the Murrumbidgee River. A tributary stream, the Molonglo, winds its way through the territory and gives colour and variety to the landscape. All agree that Canberra is a beautiful spot and well chosen from the standpoint of climate. The district is becoming popular as a residential area. Canberra is about midway between Melbourne and Sydney, Australia's two greatest centres of population, and is on the main rail route from Sydney to Adelaide.



Courtesy Keystone View Co.

THE FINKE POLICE CAMEL PATROL, NORTHERN TERRITORY.

The officer-in-charge of the Finke Police Station, in Australia's Northern Territory, has the largest police patrol in the world—523,000 square miles. It takes him three to four months to complete his rounds.

The Northern Territory is a tropical land with heavy rains of the monsoon type along the coast. Plants grow rapidly but are checked by a period of heat and drought. The coastal area is largely undeveloped. White labour does not care for tropical heat and Asiatic labour is forbidden. South of the coastal belt a fine healthful tableland is used for rearing beef cattle and horses.

Darwin (2,538), is the capital and the only town of any size. It has a busy airport, and planes from overseas often make this their first port of call in Australia. Northern Australia, like northern

Canada, is very air-conscious, and air travel is becoming the most common means of transportation. The radio, too, is playing an important part in developing these great empty spaces. It is often the only means that isolated outposts have of keeping in touch with one another, and with the rest of the world. The overland telegraph line from Adelaide connects at Darwin with the submarine cables to Java and to England. A railway runs south, a distance of 200 miles to Katherine on the tableland. It is hoped to extend the line to Alice Springs in Central Australia, and the railway which comes up to that point from Adelaide. Central Australia is an area of inland drainage. It is hot and very dry.

An area of 523,000 square miles and a white population of 12,494 almost tells the story in a sentence.

INDUSTRIES

Manufactures of Australia.—The manufactures of a country, as a rule, depend upon the utilization of the natural products of the soil and of the land. In a country such as Australia, where sheep and cattle are reared in very large numbers, hides from the slaughtered animals represent a valuable by-product of the pastoral industry. New South Wales and Victoria, with a supply of cheap coal close at hand, are in a position to manufacture the total output. There are ninety factories which do fell-mongering and wool-scouring, and in them some 87,000,000 lbs. of greasy wool are scoured. The people of Australia would like to scour all the wool which they produce, but importing countries demand the wool in its greasy condition. They prefer to do the scouring in their own factories and in their own way to suit the wishes of their woollen manufacturers. However, the wool-scouring factories of Australia are slowly increasing their output. There are also soap and candle factories which consume tallow, alkali and coco-nut oil.

Flour mills grind over 1,000,000 tons of flour; Australian orchards furnish the raw products for 90,000 tons of jam and preserved fruits. The sugar mills of Queensland produce 500,000 tons of raw cane-sugar, but as only white, and therefore expensive, labour is employed, a heavy duty on imported sugar is imposed to protect the local industry.

Boot and shoe factories, clothing factories, woollen mills, knitting mills, and kindred plants supply most of Australia's clothing needs.

Saw-mills, sash and door and box factories use the product of Australian forests. As this is not sufficient for the country's needs,

considerable quantities of lumber are imported from Canada and the United States.

Agricultural implements, mining, smelting, and textile machinery, and railway cars are produced mainly in Victoria and New South Wales. Large metal-extraction and ore-reduction works in New South Wales, South Australia, Western Australia, and Tasmania provide most of the raw materials.

Motor-car, motor-cycle, aircraft, and bicycle works give employment to many people. Australia imports the motor-car chassis and builds the body. Australia makes her own furniture and wine, mines her own coal, and brews her own ale and stout. The people in the land 'down under' are becoming self-supporting to a marked degree. Australia no longer consists chiefly of rural communities, but is about 60 per cent industrialized. In relation to her population, Australia has a remarkable number of large cities.

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NEW ZEALAND AND THE PACIFIC ISLANDS

The Dominion of New Zealand is a land of great beauty with lofty snow-clad mountains, deep river gorges, and steep-sided fjords. There are fertile alluvial plains and valleys, narrow winding lakes, broad lava plains, boiling pools, spouting geysers, and active volcanoes. In 1948, New Zealand's population totalled 1,725,267.

Sailing eastwards from Australia across the Tasman Sea, a distance of 1,200 miles, we find that New Zealand comprises two large islands and several smaller ones. These are North Island, South Island, Stewart Island, the Chatham Islands, and a few groups of small islets. The total area is about five-sixths that of the British Isles. It is a thousand miles from Auckland peninsula to Stewart Island.

Both North and South Islands are mountainous. The rugged nature of the mountains is more marked in South Island where the Southern Alps have sixteen peaks which rise above 10,000 feet. Mount Cook dominates the range with an altitude of 12,349 feet and Mount Tasman rises to 11,475 feet. Snow lies on the higher peaks throughout the year and there are numerous small glaciers. The Southern Alps run diagonally across South Island. Where they rise from the sea in the south-west a number of winding fjords or inlets remind one of the coast of British Columbia or of that of Norway. The main range is bordered on the west by the narrow coastal plains of Westland, and on the east by the broader and better known Canterbury plains.

The mountain ranges reappear in North Island, extending along its eastern flank. They are, however, much lower (6,000 feet), and a fairly wide coastal plain is found. The centre of North Island is volcanic and much of it is covered with a recent pumice sand which is so porous that it is not suitable for agriculture. The Lake Taupo region is dominated by volcanic cones. Auckland peninsula is mainly lowland interspersed with rolling hills.

As in other places the position of the mountain ranges determines the amount and placement of the rainfall. No part of New

Zealand is far from the sea, and the climate may be described as temperate.

SOUTH ISLAND

South Island has an area of 58,120 square miles. The important centres of activity are the Westland plains, Canterbury plains, Otago plateau, Wairau plains (of Marlborough Bay), and Tasman Bay plains.

The Westland plains have a heavy rainfall and moderate temperatures. The land is heavily forested up to the snow line. Clearing is expensive and the area under crop is small. Dairying is growing in importance. Gold was discovered in the various stream beds about seventy years ago and the mining activity led to small settlements. At present the coal-fields around Greymouth and Westport provide the major mining activities. A railway now crosses Arthur's Pass in the Southern Alps and brings the Westland plains in touch with the larger settlements of the Canterbury district. A long tunnel under the pass reduces the gradient, and coal is brought by rail direct to Christchurch. There is some logging and saw-milling.

Tasman Bay and Marlborough Bay lie in the lap of the mountain ranges which cut these areas off from the Canterbury plains on the one hand and from the Westland plains on the other. Small areas of good land have been cleared, and fruit-growing is the major industry. Nelson exports apples and pears to England and to South America. The Wairau plains of Marlborough Bay are much drier, and sheep-grazing is important. Blenheim is the chief trade centre.

The Canterbury plains are the most important in South Island. They have been built up by the rivers which issue from the Southern Alps, and are about 150 miles in length by 40 miles in width. The wide river flood-plains provide thousands of acres of rich meadow lands. The early settlers found a moderate rainfall and large areas covered with a native tussock grass. Sheep-grazing soon became the important industry. Today one-fifth of the New Zealand flocks are pastured on the Canterbury plains. Wheat is grown on the more fertile parts, and towards the south there is a large acreage devoted to oats. Dairying is important on the rich volcanic soils of Banks peninsula.

Since 1882 the production of wool has gradually become of less importance, as the use of refrigeration has made it possible

to send frozen mutton and lamb to distant European and American markets. There are now freezing works handling this trade throughout the two islands. These factories find a use for every part of the animal. The skin is tanned and made into leather; the fat is boiled down and is used in the making of soap and candles; the blood, bones, and entrails are made into fertilizer for the land. The finished carcass is shipped away in vessels which have special equipment for keeping the meat frozen during its twelve-thousand-mile journey to the British market.

The growth of the frozen-mutton trade has led to a change in the type of sheep which we find on the Canterbury plains and in other sections of New Zealand. The Merino, which is so popular in the great basin of Australia, is used in New Zealand on the drier and more rugged slopes of the mountains. It produces wool of the finest quality, but does not give a good carcass for the meat trade. And so flocks of Leicester, Lincoln, Southdown, and Romney Marsh breeds are common on the low-lying and fertile plains. These not only give wool of good quality but also provide a large, fat mutton carcass.

The Otago plateau consists of old rock through which deep valleys have been cut by glacial action. Sheep are pastured on the hills and oats are grown on the plains. The valleys are noted for their orchards, some of which are under irrigation. Dunedin is the business centre for this district. Exports are wool, frozen mutton, and apples. Dunedin is also a fishing centre. Ships outfit for the Antarctic whale fisheries, and at such time the activity resembles that of St. Johns in Newfoundland.

Christchurch (123,900), is the largest sity of South Island. A tunnel through the hills connects it was the seaport of Lyttleton, a few miles distant. The steep hills around the harbour made Lyttleton unsuitable for a large business centre, and it was on the plain to the west of the hills that the city of Christchurch grew up. Christchurch is well situated to control the trade of the Canterbury plains, and is the terminal for three railway lines.

NORTH ISLAND

Here we find a fairly wide and gently sloping coastal plain bordering the eastern flank of the main mountain axis. To the west of the mountains there is a region of active volcanoes, hot springs, and geysers. This in turn gives way to a broad plain sloping west and south, with the isolated volcanic cone of Mount

Egmont standing sentinel at the entrance to Cook Strait. The rainfall is light along the eastern plain, and this part is given over largely to sheep-grazing. Gisborne and Napier are the principal towns of the east. Conditions are similar to those on the Canterbury plains. Wool and frozen mutton are the principal exports.

Wellington (131,600), is the capital of New Zealand, and the chief trading centre for the southern part of the eastern plain. It is connected by rail with Napier, and has a very desirable situation on Cook Strait. The large, deep harbour of Port Nicholson also gives Wellington control of the trade with South Island. In addition, Wellington controls the trade of the plain which lies west of the mountains and slopes to Cook Strait.



Courtesy Keystone View Co.

CATTLE-RANGING IN NEW ZEALAND.

Dairying.—North Island has a far greater number of cattle than the rest of New Zealand. The heavier rainfall over the western plains of this island and the mild climate produce wonderfully rich, green pastures and heavy yields from the fodder crops. Sheep thrive on the drier, shorter forage, where the land is well drained and the climate is moderately dry. Cattle thrive on lush green forage and do not mind a heavy rainfall and damp soil. Hence we find the western part of the island given over largely to dairying.

New Zealand has been called 'The Denmark of the South'. The making of butter and cheese has reached a very high standard of excellence. The export surplus goes largely to Great Britain where it comes into competition with similar exports from Denmark, Holland, and Canada. In view of the distance which separates New Zealand from its markets, the dairying industry of the

Dominion must be conducted on a very economical basis. The favourable factor is climate. North Island lies between 35° and 42° S., or in a latitude comparable with that of Spain. The New Zealand farmer is not compelled to provide expensive shelters for his herds and there is no long winter season during which feed must be supplied. The season for New Zealand butter occurs when the competing countries of the northern hemisphere are at their lowest rate of winter production. Then, too, movement of butter and cheese by vessel is cheap and the ships may secure a full cargo by filling their holds with wool and frozen mutton. A full cargo means low rates. New Zealand butter is even exported to Canada when Canadian supplies are low.

Although export of New Zealand butter and cheese is intimately tied up with trade in wool and frozen mutton, dairying is increasing in importance throughout both islands. It seems probable that the raising of sheep has reached its maximum development.

Phormium tenax, or New Zealand flax, is a strong-leaved plant which is native to the country and grows well in warm swampy areas. The railway from Wellington to Auckland passes through large areas of 'flax' country. The Maoris learned its use and made fishing nets, lines, ropes, and baskets, mats, and even clothing from its fibres. Today the native flax-fibre is exported to Australia, to the United States, and to Great Britain.

The Auckland region lies north of the central volcanic area and contains a large amount of rich pasture land. Dairying is the leading industry of this mild and beautiful country-side. Auckland commands the trade of the northern section of the island. The urban population of 135,900 makes it the largest city in the Dominion. This is due to its strategic location. Auckland is much nearer the steamship lanes from North America to Australia than either Wellington or Christchurch. Many vessels make Auckland a port of call where partial cargoes of goods may be unloaded and distributed by rail as far south as Wellington, 426 miles away. On the other hand, consignments of export freight may be assembled at Auckland to catch the next steamer on its way to America, Australia, or Europe. Auckland is situated on an isthmus only six miles wide.

The Province of Auckland was once heavily wooded and among the trees grew the giant kauri. This tall, straight hardwood was eagerly sought after as masts and spars for sailing vessels. Nowadays the kauri is sawn into lumber and is considered a very valuable tree. Still another product of the kauri tree is a clear, gummy

fluid which exudes from the trunk. This hardens in the air and drops down to the ground. Kauri gum is obtained by digging around the trees and in areas where the tree once grew. The gum is also obtained by tapping the trees. It is exported to Asia and to Europe, where it forms the basis of a high-grade varnish.

Maize is grown in the mild climate of Auckland, Bay of Plenty, and Hawke's Bay districts. It is used green as a food for the dairy herds and the ripened grain is fed to poultry and pigs.

The people of New Zealand depend to a great extent upon some form of pastoral industry for their living. Wool, meat, butter and cheese, skins, hides, and tallow comprise about 80 per cent of the total exports. Two-thirds of the surface of New Zealand is suitable for agriculture of some sort and for grazing; a considerable area is still under forest. The importance of manufacturing is increasing, although in the main, expansion has taken the form of the development of new branches of existing industries such as engineering, textiles, and clothing. Domestic raw materials are processed and a variety of consumer goods is being produced for the home market.

THE PACIFIC ISLANDS

The islands of the Pacific Ocean are innumerable. They extend, like stepping-stones, from the Asiatic coast to Australia and two-



Courtesy United Kingdom Information Office

THE BANANA HARVEST IN FIJI.

The matured fruit is harvested while still green. Then it is stacked on bamboo rafts, and poled down-river to packing stations, often three or four days' journey away.

thirds of the way to America. Some of these islands are the result of volcanic uplift, others are built of coral. All, save New Caledonia, belong to one class or the other.

The climate is hot, the rainfall is ample and fairly well distributed throughout the year. The soil of the volcanic islands is very fertile, that of the coral islands much less so. As a result the former produce in abundance such staples as coco-nuts, yams, breadfruit, sugar, and rice. The food supply in the coral islands is poor, consisting mainly of fish and coco-nuts.

The great world powers are in control of most of these islands, either by virtue of discovery and occupation or by forcible possession. Great Britain exercises sovereignty over Fiji, Pacific Islands (Tonga, Pitcairn, Gilbert and Ellice, Solomon, New Hebrides), Western Samoa, and Nauru; the United States over Guam and the Samoan Islands; France over New Caledonia, the Society Islands (Tahiti, Mururoa, and Papeete), and jointly with Great Britain, over the New Hebrides.

New Caledonia was formerly a French penal settlement. The island is important for its rich deposits of nickel, cobalt, and chrome which are slowly undergoing development. Agriculture has, as yet, made little progress.

Fiji Islands are conveniently located for vessels and aircraft journeying from North America to Australia and New Zealand. Bananas, sugar, maize, and coco-nuts are exported in considerable quantities. Suva is the capital and chief port.

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PART SEVEN: World View

38. The World Unit - - - - - 627

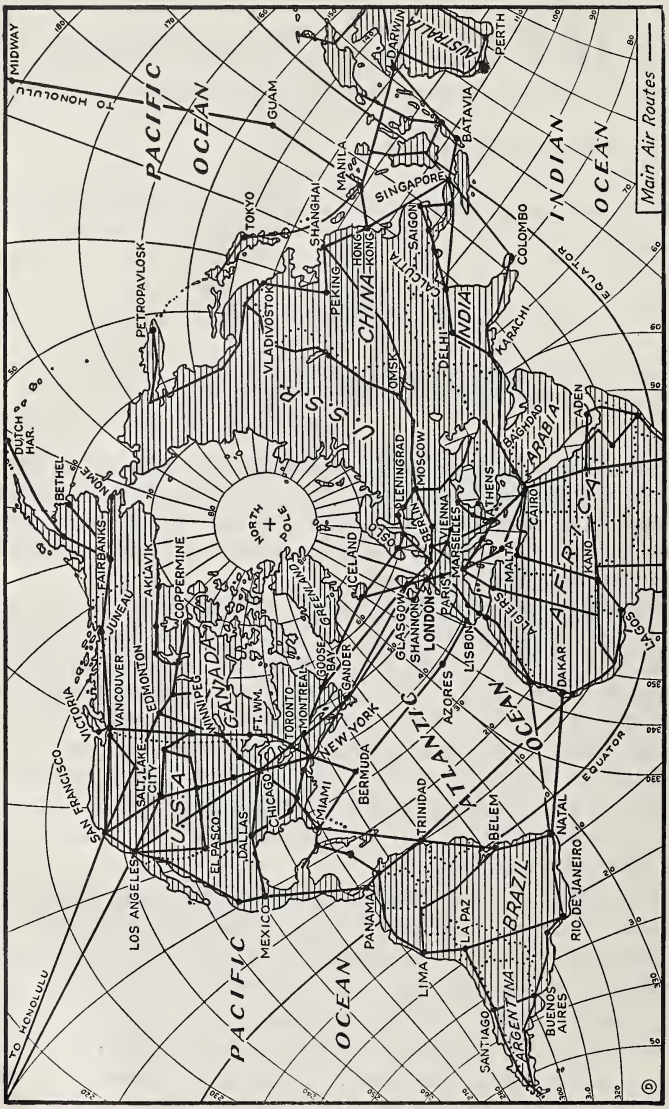
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THE WORLD UNIT

Only a few short years ago the world seemed a very large place. It took months to travel around the globe and weeks to send messages from one side of the Atlantic Ocean to the other. The events which took place in one part of the earth did not affect the rest of the globe very much.

Now conditions are very different. Messages can be sent in seconds to almost any place on the earth by telegraph, by telephone, or by radio. People who live in one country hear radio programmes from other countries. Today people travel more than at any period in history. The tourist industry is a gigantic business with the entire world as its setting. By aeroplane the globe can be circled in a matter of days. By standard airline schedules Montreal is just overnight from London, England. By the newer types of commercial aircraft the Atlantic has been spanned in little more than four hours.

The patterns of international trade and business have tied every Canadian to areas of the world once considered remote and of no consequence to us. Now Canadian workmen earn their living by building locomotives that carry the people of India through their country. Ships built by Canadians are in the service of France and China. Canadian designed and built planes are used in the commercial air services of nearly every country of the world. Canadian farmers earn their living by growing grain that feeds families in Britain and Japan.

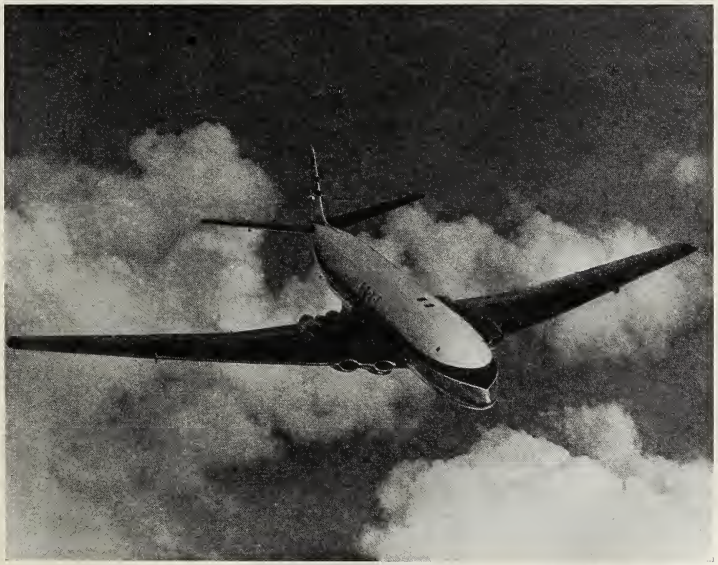


Air-travel narrows the frontiers of the world.

In brief, the world is a single economic unit, although it is not yet a political or cultural unit.

Communications and transportation improvements have been quickly utilized to tie business together into a global pattern. These same communications and transportation systems are also more gradually bringing about a blending of the different cultures throughout the world. The earlier phases of this cultural blending may be painful to many people because there are those who do not want to understand or learn new ways of doing things. There are also many people with strong prejudices against other culture groups. These prejudices are invariably based on ignorance or emotion rather than on common sense or reason.

Let us hope that, before too long, world wide understanding and blending among the world's peoples may develop to the point where all cultures may exist harmoniously side by side on our crowded planet.



Courtesy De Havilland

THE COMET.
The new B.O.A.C. jet liner. It is the first jet aircraft to be put into commercial flying service.

PART EIGHT: Appendix

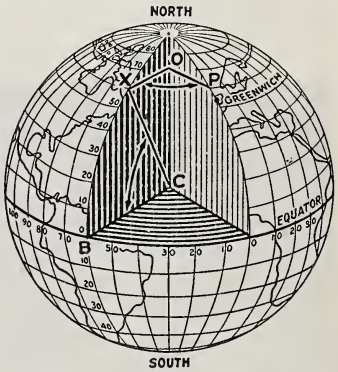
SECTION I

MATHEMATICAL GEOGRAPHY

Maps and Map Projections

The earth is a sphere. To get an accurate conception of directions, distances, areas, and shapes of land masses, it is necessary to use a globe. But a globe cannot be carried conveniently or spread out on a desk; so we use a map in its place. If you peel an orange, keeping the skin in one piece, you cannot spread it out flat. A small piece flattens out quite well. Thus a map of a small area is quite accurate, whereas world maps are not accurate, as they cannot show true distance, directions, areas, and shapes all on the same map.

On a globe the meridians of longitude cross the parallels of latitude at right angles. The meridians meet at the Poles. This cannot be shown on a flat surface and, consequently, inaccuracies result. Different map projections are used for different purposes. The most common projections are described in the following sections.



LATITUDE AND LONGITUDE

The latitude of a point on the earth's surface is its angular distance north or south from the equator, along the meridian of the point to be measured. Thus the latitude of a place is equal to the angle between the direction of a plumb-line at the place and the plane of the equator. (Angle XCB on the diagram.) The longitude of a point on the earth's surface is its angular distance east or west of the Greenwich meridian, which is taken as a standard. (Angle XOP on the diagram.)

(i) Circumpolar Maps

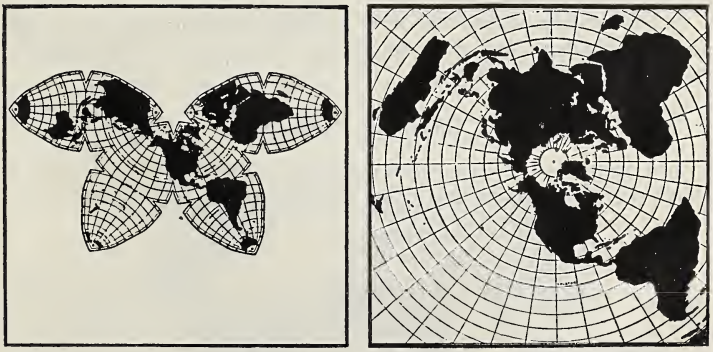
Circumpolar maps of the northern or of the southern hemisphere are useful for they represent, fairly accurately, distances. areas, and shapes.



A south pole-centred map shows the relative lack of land and population in the southern half of the earth.

Directions from the centre outwards are clearly shown, but directions east and west are not well defined. Relations between places in the northern and southern hemispheres are not clear.

To attempt to show the whole world on such a map leads to grotesque distortions of places beyond the Equator as the Meridians diverge instead of converge. Map designers have resorted to splitting the region south of the Equator into suitable sections as shown in the following diagrams.



Circumpolar Map Designs.

The shapes of Africa and Europe in the accompanying illustration are correct, as the Prime Meridian is the central Meridian of this projection. To gain a true conception of the shape of Australia and Asia, those continents would have to be set at the centre of the map. Then the 120th east meridian would be the central meridian and the Prime Meridian would be drawn to the west of it, and curved from north to south.



MERCATOR'S PROJECTION.

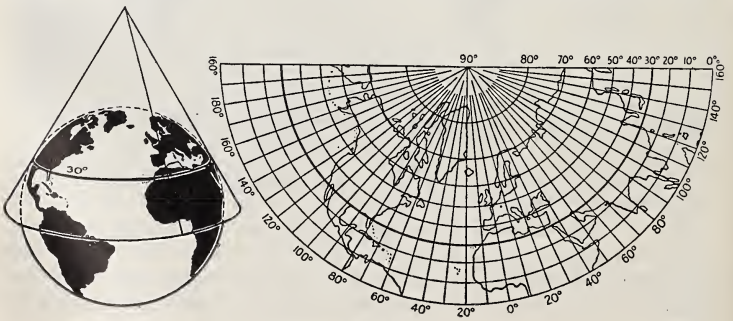
(ii) Mercator's Projection

The maps of the world you are accustomed to using in your Atlas are probably based on Mercator's projection. Here the meridians cross the parallels at right angles, but they do not converge towards the Poles.

In low latitudes shapes and areas are approximately true, but in high latitudes distances and areas are grossly exaggerated. This projection does show directions clearly.

(iii) Conic Projection

This projection is well suited to show mid-latitude areas, such as North America, without too much distortion. It is also a good projec-



CONIC PROJECTION.

tion for general purposes, since it compromises between distance and direction. It gives neither true direction nor true distance, but it is not very far out on either over limited areas.

COMPARISON OF SELECTED MAP PROJECTIONS

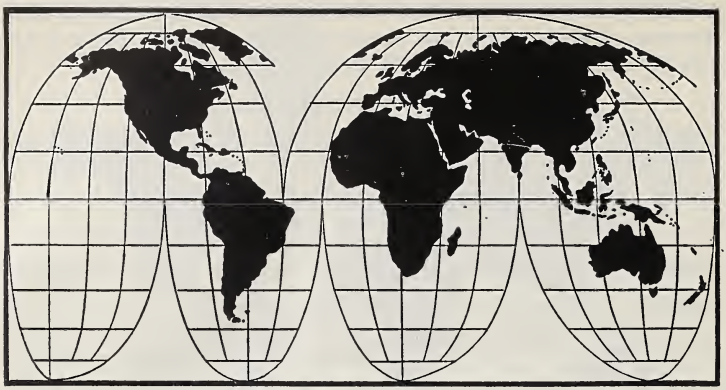
	Polar	*Mercator*	*Conic*
Latitude Lines	Concentric circles.	Straight, parallel. They get progressively farther apart towards the Poles.	Curves.
Longitude Lines	Radiating straight lines.	Straight, parallel, equally spaced.	Straight converging towards the Poles.
Direction	Does not give true direction, except due North and South.	A straight line between any two points gives true direction.	Does not give true direction. (Straight line only gives true direction if places are north or south of each other.)
Distance	Straight lines (through centre of map) give true disance.	Straight line is *not* the shortest distance between places.	Does not give true distance.
Uses	Navigation maps of polar areas.	Navigation of areas near Equator.	General purpose maps—road maps, etc., large scale maps of small areas, for mid-latitudes, *e.g.* continent maps of North America.

(iv) Other Projections

Mollweide's Projection keeps areas in their correct proportion, but towards the edges of the map the shapes of the continents are greatly distorted. The shapes of the land masses lying near the meridian running through the centre of the continents are true.



MOLLWEIDE'S HOMOLOGRAPHIC PROJECTION.



GOODE'S INTERRUPTED HOMOLOGRAPHIC PROJECTION.

Goode's Projection is adapted from Mollweide's. Whereas Mollweide used one central meridian, Goode used three, thus eliminating extreme distortion.

Gaps appear in the ocean but not in the land masses. Areas, shapes, and distances are truly represented, and though some directions are clear, others are not.

GREAT CIRCLE NAVIGATION



GREAT CIRCLE ROUTE.

If you experiment with a globe and a piece of string, you will find that the shortest distance between two points on the globe is a part of a circle, the plane of which passes through the centre of the globe. Circles whose planes pass through the centre of the earth are known as great circles.

The equator is a great circle and the meridians are all halves of great circles. Any number of other great circles can be drawn. The shortest distance between two places is an arc of the great circle on which they lie. Ocean routes on Mercator's projection appear as curved lines. This is because as far as possible ocean routes follow great circle routes. In this day of air travel, great circle routes are very important and account for the new interest being taken in Arctic lands. Many of the great circle routes between places in North America and Europe pass over these frozen northlands. The only dependable means of visualizing these relationships is constant reference to the globe.

SECTION II

CLIMATIC AND NATURAL VEGETATION REGIONS

Natural Climatic Regions

Man's life on the earth has been determined largely by certain geographic controls, the chief of which is climatic. For this reason many modern geographers classify regions according to climate, since occupations in similar natural regions are, or usually can be, developed along similar lines. Mineral resources, the age of the civilization in the region, the position in respect to other populations, and other factors do play a very important part in the economic development of an area; but the same crops will grow and industrial activity will follow much the same pattern if similar natural regions are inhabited by progressive peoples. Mediterranean type regions all produce grapes and citrous fruits; west coasts in middle latitudes are, or have been producers of high quality soft woods; and all middle latitude plains are important for grain production.

There are several classifications of natural regions, but, though the names vary, they are very similar. All regions will be included among the following classifications, based on climate and vegetation.

(i) Low Latitude Climates

1. Equatorial forest regions
2. Grasslands
3. Monsoon lands
4. Hot deserts

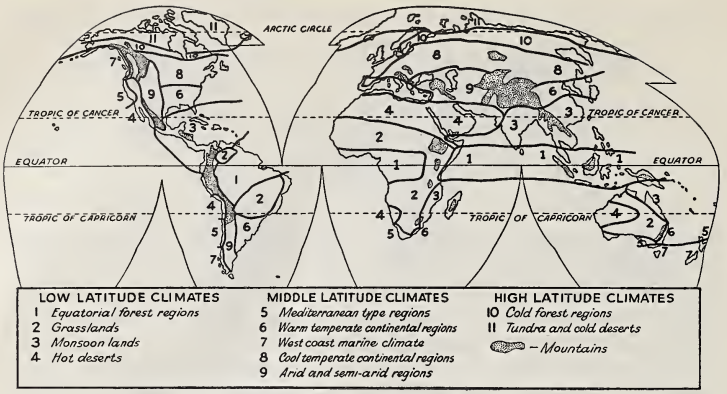
(ii) Middle Latitude Climates

5. Mediterranean type regions
6. Warm temperate continental regions
7. West coast marine climates
8. Cool temperate continental regions
9. Arid and semi-arid regions

(iii) High Latitude Climates

10. Cold forest regions
11. Tundra and cold deserts

The accompanying map shows the areas of the world which can be included in each type of natural region. It must be remembered that there is no sharply defined boundary between two regions and one gradually merges into the other. The lines on the map dividing the world into these natural regions are, therefore, only approximate.



NATURAL CLIMATIC REGIONS.

Topography plays an important part, and for that reason high mountainous areas are difficult to classify.

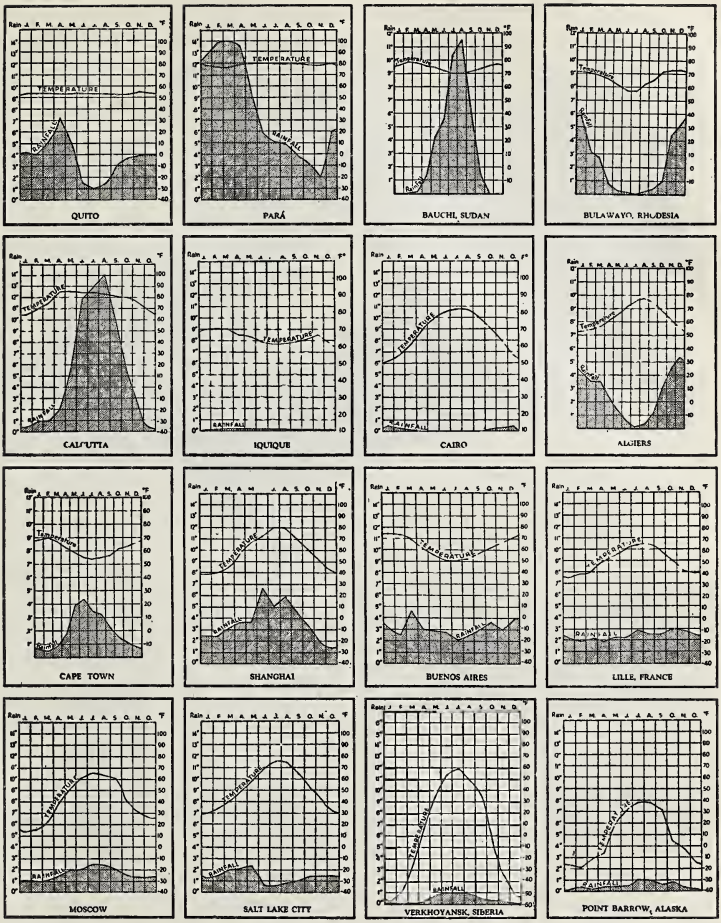
A brief description of the climate of each type of natural region will follow. Consult your map to find out what areas of the world can be included in each type of natural region.

Equatorial forest regions.—These regions lie within 10° of the Equator. They are characterized by heavy rains and high equable temperatures. The noon sun is always high in the sky, being directly overhead twice a year, so that the rays are received directly, and not at an angle as in higher latitudes. This results in the high average temperature of about 80°F. These regions have a heavy rainfall as they are in the region of the Doldrums. The inblowing Trades force the light, heated air up, where it cools, and condensation takes place.

Each day shortly after noon, dark black clouds form, and heavy rains fall. It clears quickly but the air remains oppressively warm. The high temperatures and heavy rains cause a dense forest growth.

Temperature and rainfall both decrease with altitude, and the highland regions of South America and Africa are grassland regions rather than Equatorial forest regions. The low coastal plains and river valleys are unpleasant for the white man, but favorable growing conditions have aided the development of plantations producing such crops as rubber, sugar, and cocoa. The work is done by those native to the area under the direction of white overseers.

The graphs of Quito and Parã on page 637 show typical Equatorial temperatures and rainfall distribution. The single line shows temperature and the shaded portion shows rainfall. Account for the lower temperature and rainfall of Quito which, though at the Equator, is in a Grassland region.



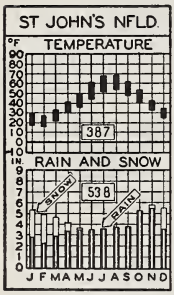
TEMPERATURE AND RAINFALL GRAPHS

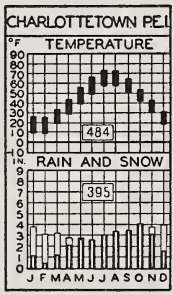
Illustrating conditions in the natural climatic regions of the world.

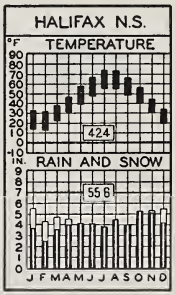
Acknowledgement is made to the Dominion Bureau of Statistics for the graphs which appear on the following two pages.

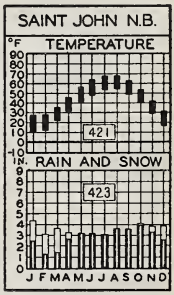
Temperature and Rainfall Charts for Canada

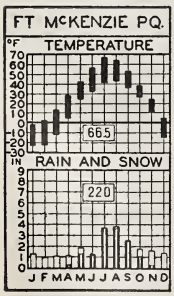


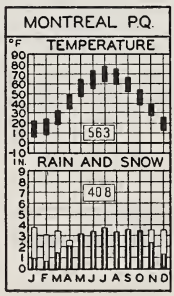


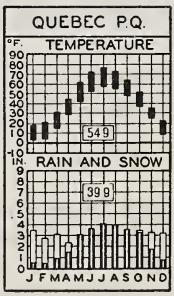


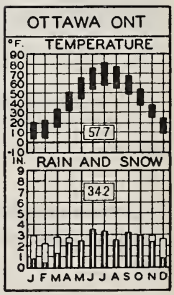


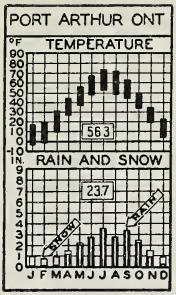


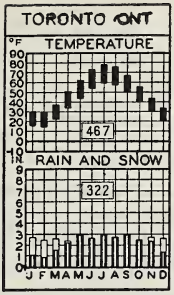


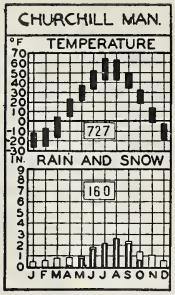


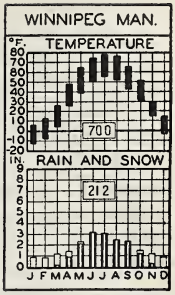


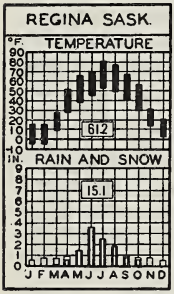


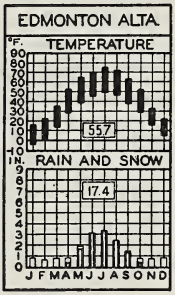

PORT ARTHUR ONT
°F TEMPERATURE
563
IN. RAIN AND SNOW
237
SNOW
RAIN
J F M A M J J A S O N D

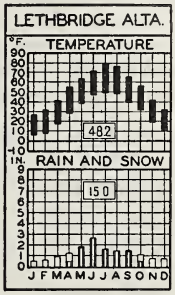

TORONTO ONT
°F TEMPERATURE
467
IN. RAIN AND SNOW
322
J F M A M J J A S O N D

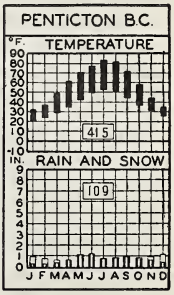

CHURCHILL MAN.
°F TEMPERATURE
727
IN. RAIN AND SNOW
160
J F M A M J J A S O N D

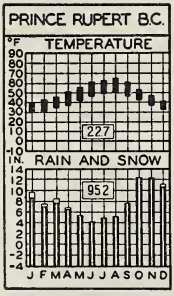

WINNIPEG MAN.
°F. TEMPERATURE
700
IN. RAIN AND SNOW
212
J F M A M J J A S O N D

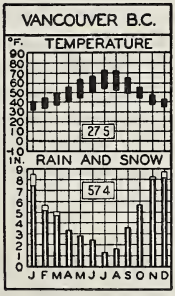

REGINA SASK.
°F. TEMPERATURE
612
IN. RAIN AND SNOW
15.1
J F M A M J J A S O N D

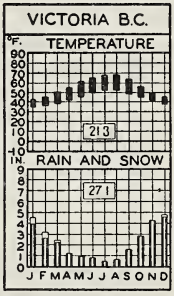

EDMONTON ALTA.
°F. TEMPERATURE
557
IN. RAIN AND SNOW
17.4
J F M A M J J A S O N D

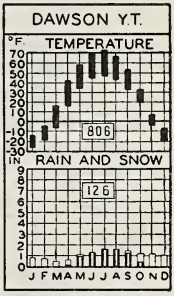

LETHBRIDGE ALTA.
°F. TEMPERATURE
482
IN. RAIN AND SNOW
15.0
J F M A M J J A S O N D

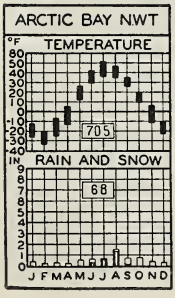

PENTICTON B.C.
°F. TEMPERATURE
415
IN. RAIN AND SNOW
10.9
J F M A M J J A S O N D

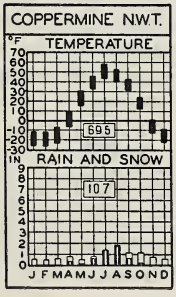

PRINCE RUPERT B.C.
°F TEMPERATURE
227
IN. RAIN AND SNOW
95.2
J F M A M J J A S O N D

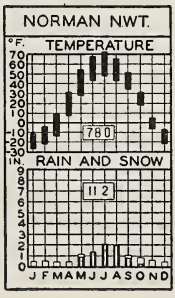

VANCOUVER B.C.
°F. TEMPERATURE
275
IN. RAIN AND SNOW
57.4
J F M A M J J A S O N D

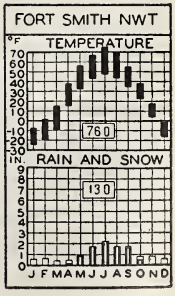

VICTORIA B.C.
°F. TEMPERATURE
213
IN. RAIN AND SNOW
27.1
J F M A M J J A S O N D


DAWSON Y.T.
°F. TEMPERATURE
-30
806
IN. RAIN AND SNOW
12.6
J F M A M J J A S O N D


ARCTIC BAY NWT
°F TEMPERATURE
-40
705
IN. RAIN AND SNOW
6.8
J F M A M J J A S O N D


COPPERMINE N.W.T.
°F TEMPERATURE
-30
595
IN. RAIN AND SNOW
10.7
J F M A M J J A S O N D


NORMAN N.W.T.
°F. TEMPERATURE
-30
780
IN. RAIN AND SNOW
11.2
J F M A M J J A S O N D


FORT SMITH N.W.T.
°F TEMPERATURE
-30
760
IN. RAIN AND SNOW
13.0
J F M A M J J A S O N D

Grasslands.—As latitude increases, the angle at which the sun's rays strike the earth diminishes correspondingly. Thus when the noonday sun is perpendicular at the equator, at latitude 70 degrees north or south, it strikes the earth at an angle of 20 degrees. When the daily path of the sun moves to the north, the region of the Doldrums moves with it, leaving regions 10° or more south of the Equator in the path of the drying Trades. Six months later these same regions are directly under the noonday sun, and heavy Equatorial rains occur. Because of these alternate wet and dry seasons, vegetation is not so dense and grasslands with occasional clumps of trees are found. The nearer the Equator the region is, the more luxuriant the growth. These grasslands are regions of transition between the Equatorial forests and the deserts which lie in the vicinity of the Horse Latitudes. Temperatures are high but there is a greater annual range than in Equatorial forest regions. Rainfall is seasonal and depends on latitude. Study the graphs for Bauchi, Sudan, and Bulawayo, Rhodesia, on page 637.

Monsoon lands.—Because of the similarity of climate of Hot Grasslands and Monsoon regions, these regions are often classified as having what is called the tropical type of climate. The chief characteristics of the climate are the heavy summer rains and the prolonged dry season during the winter months. The heavy summer rains are caused by the Trades blowing from the sea to the land, and the winter dry season by the fact that these regions lie in the Horse Latitudes. In some regions, the heating of the land causes the Trades to be deflected towards the low pressure area which is formed. Study the maps of India on page 519 showing the direction of the winds in winter and summer. The effect of the land mass of Asia on planetary winds is so marked that the winds are known as summer and winter monsoons. Temperatures are high the year around, ranging from 60° to 80°F., though summer temperatures for some interior cities may reach a monthly average of 90° F. or more. Note the graph for Calcutta on page 637.

Low Latitude Deserts.—As the Trade Winds blow towards the Equator they dry up the land over which they blow, as they are becoming warmer. Coastal regions in the path of the Trades receive heavy rains especially if these winds are forced to rise over land sloping upwards. But those areas towards the west of continents in the Trade wind belt receive little if any rain. The extent of the desert depends on the size of the land mass and the position of the mountain chains. During the winter months, these lands may not be affected by the Trades, but they then lie in the region of the Horse Latitudes which, because of descending air currents, is a region of clear skies and high temperatures. Because of the absence of water vapour in the air and clouds, the temperature at night often drops to below freezing point

as the heat is radiated rapidly from the rock or sand. Thus, the daily range of temperature is often greater than the annual range.

Because of unequal heating, the convection currents often cause severe wind storms which revolve rapidly about a low pressure centre, carrying with them sand and dust. These are feared by desert dwellers as are the tornadoes in the central United States, or the typhoons of the China seas. Note graphs for Iquique and Cairo on page 637.

Mediterranean Type Regions.—Regions of this type are found in all continents. They lie north or south of hot deserts along west coasts and around the Mediterranean basin. During the summer months they are either in the Trade wind belt or in the Horse Latitudes. Therefore, there is little rain. As the wind belts move with the Heat Equator, these regions come under the influence of the Westerlies blowing from the sea, and, therefore, they get winter rains. Summers are warm and winters cool. Winter temperatures are modified by the Westerlies blowing from the sea, the average for the coldest month being close to 50°F. The occasional cold spell experienced by California or the southern coast of Europe is caused by cold winds blowing from high pressure areas which may move south from the Arctic over North America or Europe. In the southern hemisphere the absence of land masses in middle and high latitudes accounts for the fact that Mediterranean type regions of Australia, South Africa, and South America are free from such cold spells. Compare the graphs for Algiers and Cape Town on page 637.

Warm Temperate Continental Regions.—These regions lie to the east of the continents between latitudes 25° and 35°. They lack the moderating influence of the oceans because the interior parts are far from the sea and the eastern regions receive west winds rather than winds from the oceans on the east. The summer temperatures are usually above 70°F. for at least three months, and the winter monthly averages drop to as low as 40°F. The large land masses of Asia and North America cause at times severe cold spells during the winter which similar areas in the southern hemisphere do not experience. The annual rainfall varies from 25 inches to 50 inches, increasing towards the eastern coasts. It falls throughout the year, although the greater portion is received in the warm summer months. The long growing season of over 180 days makes agriculture the most important occupation of these regions. Study the graphs for Shanghai and Buenos Aires on page 637.

West Coast Marine Climate.—Polewards from Mediterranean type regions along west coasts lie what are known as west coast marine regions. As they lie in the path of the Westerlies the year round temperatures are moderate and rainfall abundant. At times cold winds from high pressure areas formed over the cold interior to the north-

east cause temperatures to drop below freezing point, but generally the January average will be around 40°F. The greater part of the rainfall occurs in the cooler months though it is fairly well distributed throughout the year. The annual rainfall will vary from 30 inches in some places to well over 100 inches in others, the amount being determined by the direction and height of mountain ranges. A much greater area in Europe can be included in this type of natural region than in North America, as the moderating effect of the Westerlies is not cut off in Europe as it is in North America by the Coast and Cascade ranges. The effect of the North Atlantic Drift, since the winds blow from the sea, extends this region as far north as 65°N. along the coast of Norway. In the southern hemisphere only New Zealand, Tasmania, and the southern coast of Chile can be included, and the absence of land masses to the south makes for moderation of the climate.

Since these regions are in the path of the Westerlies, the procession of cyclones and anticyclones across them cause great changeability in the weather from day to day. Compare the graph for Lille, France, on page 637, with those for Vancouver and Prince Rupert on page 639.

Cool Temperate Continental Climate.—The greater part of the cool temperate belt of North America, Asia and Europe has a continental type of climate, cold winters and warm summers. These regions lie in the belt of the Westerlies, but they are either so far from the sea, or shielded by mountains, that the moderating influence of the seas to the west is not felt. The winters are very cold. January temperatures in many places averaging well below zero. Eastern coasts are not moderated by the sea as are western coasts since the prevailing winds blow from the land. The January average for Halifax is only 24°F. Summers are very warm, July averages being over 70°F.

Rainfall varies and increases from west to east in North America. The Westerlies pick up the moisture transpired into the air by plants and trees as they sweep across the plains, thus increasing in humidity, and, when forced to rise, dropping more moisture than in the western parts of the plains. The rainfall is well distributed, although generally more falls in summer than in winter. However, the summer precipitation evaporates quickly, whereas in winter it is stored in the form of snow, and is of more benefit to agriculture than the summer rains.

The weather is variable as these regions are in the Westerly belt. Occasionally tornadoes form because of unequal heating in interior regions. These cause great damage in some of the central states of the United States of America.

The size of the land mass of Asia results in even greater extremes of temperature and the winters are much colder than in similar latitudes of North America and Europe. Because of the extremely cold winters and warm summers, the winds blow from and towards Central Asia, causing the Monsoon winds of southern and eastern Asia. Com-

pare the graph for Moscow on page 637, with those for Winnipeg and Halifax on pages 638 and 639.

Arid and Semi-arid Regions of Middle Latitudes.—East of the Mediterranean type regions and west coast marine regions are arid and semi-arid regions of the middle latitudes. Many plateau lands of the temperate belt can be included with these regions though they lie but a short distance from the sea.

As these regions lie in the path of the Westerlies, the driest areas are those that are in the rain shadow of the mountains to the west, for example, the foothills of the Rockies. Precipitation increases towards the east. Rainfall varies from very little annually to a maximum of about 20 inches. It is sufficient to support enough grass to make these regions the foremost grazing areas in the world. Rainfall is uncertain and varies from year to year. This has added the threat of soil erosion to the problems of the farmer in these areas and made it necessary for the government to enforce regulations to prevent overgrazing.

Temperatures are extreme, hot summers and cold winters, especially in those areas far from the sea. Where these regions border the hot deserts of the Tropics, summer temperatures are very high.

As the soil of these regions is unleached, irrigation projects have been very successful in the United States and Canada, and many thousands of acres have been brought under intense cultivation. Compare the graph for Penticton, B.C., on page 639 with that for Salt Lake City on page 637.

Cold Forest Regions.—Polewards from the temperate regions of the northern hemisphere lies a belt of forested land known as the taiga. Along the southern margin of this belt there is a growing season of 90 days, although the temperature for the three warmest months rises little above 50°F. These regions have the greatest annual range of temperature, over 100°F. The maximum temperature during summer months sometimes reaches 90°F. and the record low temperature of 94°F. was recorded at Verkhoyansk in Siberia. Along the northern limit of this area, there is only one month when the temperature averages as much as 50°F.

Precipitation is less than 15 inches per year, but evaporation is slow. The ground is frozen most of the year and when the thaw comes, rivers overflow because of ice jams. For this reason cold forests are characterized by many lakes, swamps, and muskeg, making road-building very difficult. It is only during the summer that plants and trees can get sufficient water for growth as the ground is frozen most of the year. Growth, therefore, is very slow, the trees are small, and take many years to develop. The long days do help to make up for the shortness of the growing season.

These forests are made up of pine, spruce, fir, birch, and aspen. As one advances polewards the trees gradually decrease in size until

they give way to tundra and a few stunted junipers. Note the graph for Verkhoyansk, Siberia, on page 637.

Tundra and Cold Desert Regions.—The tundra belt stretches along the shores of the Arctic and along the outermost fringe of Antarctica. Temperatures are modified by the oceans, and the climate is not as extreme as that of the cold forests. Summer temperatures do not average 50 degrees but the coldest month does not usually drop below 50 degrees below zero. Precipitation is very light, but when the snow and ice melt in the short summer, the slowness of evaporation and poor drainage because of the frozen sub-soil result in a general mushiness of the surface ground.

Towards the Poles the tundra gives way to ice desert and polar caps, regions said to have a glacial climate. These are lands permanently covered by snow and ice where the temperature never rises above the freezing point. The interior plateau of Greenland and the major part of Antarctica have this type of climate. There is practically no precipitation, but the snow which does fall does not melt but piles up. Fierce blizzards, especially in the Antarctic, make these regions most uninviting and unfit for human habitation. Study the graph for Point Barrow, Alaska on page 637.

Summary.—It should be possible for the student of geography to memorize the basic facts about each type of natural region. As you study the political divisions of the world, consult your map of natural regions and it will give you a clue to the type or types of climate you may expect to find in each country. Some of these are explained in greater detail in the text.

EXERCISES

1. Why does the annual range of temperatures increase as one moves away from the Equator?
2. Suppose the Gulf of Mexico were land. What changes would you expect in the climate of Mexico?
3. Suggest ways in which a great annual range of temperature affects people and their occupations.
4. Why is there an ice cap over Greenland and not over land in the same latitude in Asia.

SECTION III

SOILS

The map on page 646 shows the main soil groups of the world. The type of farming and the way of life of the people in various regions depend on the climate and the kind of soil. The following are descriptions of the main soil groups and the ways in which they are used.

Tundra.—Cold and frost in far northern regions and on the tops of mountains prevent all but a little plant growth, including that of microscopic plants which help to make the soil. Thus very little true soil is formed. Although bright flowers may grow in summer and some green growth remains under the snow, the tundra cannot support agriculture as we know it. With careful management, there should be enough grazing for either wild or tame animals to support a small population.

Podzols.—These are the soils formed under the evergreen forests of the north where the climate is cold and where there is more rainfall than is necessary for the growth of plants. Decayed leaves and wood form a black topsoil which is quite acid. The rain washes the acid into the subsoil and leaches much of the lime and fertility from it. Under careful management this soil can be cultivated for some crops, especially rye and potatoes. This soil can be recognized by the pale grey, ashy level a few inches under the surface. Soils of this type are called Podzols from the Russian word meaning ashes. (Because Russia is a large country which contains many types of soil, the Russians were the first to recognize the main kinds of soil and gave names to them.)

Much of Northern Canada, Scandinavia and the U.S.S.R. is covered by these soils, and spruce and pine are grown for pulp and lumber.

When the mineral part of the soil is a heavy clay and drainage is poor, there is very little real soil development. The decayed leaves and wood remain on the surface as peat. The subsoil is heavy and sticky and hard to cultivate for crops. It takes years of special management to make the land suitable for farming and it is only when there is a great demand for farmland that countries open up this land for settlement.

Grey-brown forest soils.—These soils are formed in the same way as podzols but occur where the climate is warmer, and where the forest cover is of broad-leaved trees. There are often minerals like lime to neutralize the acids. The weathered soil, in which most root growth is found, varies from about two to five feet. The dark coloured topsoil is underlain by a light grey or yellow 'horizon', something like the ashy level in the podzols.

THE GREAT SOIL GROUPS
T TUNDRA SOILS
PO PODZOLS
FC GRAY BROWN FOREST SOILS
P PRAIRIE SOILS
FW SOILS OF MOIST WARM AND HOT CLIMATES
CH CHERNOZEMS
B BROWN PRAIRIE SOILS
D DESERT SOILS
M SOILS OF MOUNTAINOUS COUNTRY
TUNDRA
PODZOLS
CHERNOZEMS
DESERT SOILS

The subsoil is brown in colour, and breaks easily into nut-like pieces. The topsoil is loose and crumbly. These conditions allow free movement of air and water, and penetration by roots.

Areas of these soils are among the most intensively cultivated and often support dense populations. Mixed farming producing grain and cereals, hay and pasture, and meat and dairy products, feeds the industrial towns and cities. The civilization which we share with the British and North-western Europeans grew up on these soils.

Prairie Soils.—The prairie soils are a transition between those of the cool moist climates (podzol soils), and those of dry climates. The type of farming which they support is like that of the grey-brown forest soils.

Soils of moist, warm, and hot climates.—In the eastern part of North America, as one travels southwards from the regions of grey-brown forest soils, one finds moist climates that are very warm in summer and have short, mild winters. Before the land was cleared, it was covered by broad-leaved forests. The soil-building processes have been more active here than in the cooler regions, and so has the process of erosion. The rich forest growth, especially in sub-tropical and tropical climates, gives the appearance of very fertile soil. These areas have supported cash crops of tobacco, cotton, corn, sugar, coffee and citrous fruits for generations, but the soil has some disadvantages. The surplus rain washes fertility out of it, and the warm climate slowly 'burns out' the organic matter; also it is very subject to erosion on sloping land.

Under forest cover, or when used sparingly by people with a primitive form of civilization, these soils retain their fertility. When used by European peoples, especially for cash crops, they soon wear out and erode. In the meantime, advances in science have allowed the native populations to grow. With more people and less fertile soils there is now, in many areas, the problem of producing enough to feed the population.

Chernozems.—The rich, black soils which have made the American mid-west, the Canadian prairies and the Ukraine famous for grain production are chernozems. In dry climates, the movement of moisture in the soil is upwards, so that the fertility is drawn up to the topsoil. The chernozems and other dry climate soils are easily recognizable: the topsoil is much deeper than that of the podzolic and other forest soils, and is black from the accumulation of decayed vegetation.

Chernozems have been much used for the commercial growing of grain, especially wheat, for export to other areas. Because of low rainfall, crop yields per acre are lower than on forest soils, but a comparatively few people on large areas can produce large surpluses for export.

In recent years, farming in these regions has become more diversi-

fied, with alfalfa, clover, hay and grains other than wheat being grown for livestock consumption. These soils change considerably when cultivated and are subject to wind erosion. Grasses and clovers help to hold and rebuild the soil so that the trend away from cash grain farming is for natural as well as economic reasons.

Brown Prairie Soils.—There are formed under drier conditions than the chernozems. The level of lime is much higher and in very dry places lime and alkali salts occur at the surface. With a dry climate there is less plant growth and therefore less black humus in the topsoil. Less grain is grown because of the risk of drought and more grass is grown for cattle grazing. Over-cultivation and too intensive grazing expose the brown soils to wind erosion.

Desert Soils.—Like the other dry climate areas, deserts have soils of high mineral content but little or no organic matter. When water is available from rivers or artesian wells irrigation is practised but the saltiness of the soil may be aggravated by unwise management.

Soils of mountainous country.—Recent deposits of soil-wash in valleys may make the land fertile and easy to cultivate, and in mountainous regions there are many areas of intensive farming, especially where irrigation is possible. The mountains themselves are either barren or wooded and quite unsuited to farming. There are too many variations within small areas to allow classification of these soils on a world basis. They are, in their detail, of special interest to the people who live in such areas.

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